THE IMPACT OF LIVESTOCK AND GENDER ON HOUSEHOLD EXPENDITURE
PATTERNS IN THE COPPERBELT PROVINCE OF ZAMBIA

BY

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THESIS

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Abstract

Livestock have long been considered an important asset, especially for poor people in developing countries. Many researchers have suggested that livestock can provide a means for development and growth and can be an effective pathway out of poverty for millions of people. Despite the recognized importance of livestock, there remains a dearth of studies that have used household data to test the impact of this asset. Using a panel data set from the Copperbelt Rural Livelihood Enhancement Support Project (CRLESP), this study examines the impact of livestock on household expenditures. Specifically, the study compares the changes in food budget shares for households that have income from livestock and households that did not have livestock income during the study period. Furthermore, the study examines whether the impact of livestock as an asset is different when women control the asset. Unique features of the data and the setting avert concerns of endogeneity that affect studies of this type. The thesis first uses non-parametric local polynomial smoothing estimation to create Engel curves for households exogenously treated with livestock ownership and control households. Next, budget share regressions are run using Seemingly Unrelated Regressions (SUR). A relationship appears to exist between food shares and the sex of the household head, but tends to vary with changes in the specification of the econometric model. The results indicate that households receiving livestock income are more likely to spend their additional income on food, compared to other sources of income. Thus, livestock development might be a particularly effective mechanism for addressing some forms of food insecurity.

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Chapter 1
Introduction

Livestock's contribution to livelihoods, particularly those of the poor in developing countries is well recognized. According to FAO (2003), as many as 2 billion people rely on livestock to meet some of their daily needs. In recent years, rising incomes and population growth has led to a rising demand for livestock and livestock products, especially in Africa (Jabbar, Baker and Fadiga, 2010). Livestock acquisition has thus become an important pathway out of poverty. This type of on-farm income diversification can move households away from sole reliance on crops and help households have more continuous income flows.

However, investment in larger animals is typically beyond the means of poor households. The realization that owning cows could eliminate dependence on temporary aid led to the motto "*a cow, not a cup*", and the establishment of the Heifer Project International (HPI) (www.heifer.org/ourwork/mission). HPI has been working to provide animals to millions of poor people around the world since the 1940s. Their work in Africa has often paid particular attention to assisting women. Anecdotal and qualitative evidence of the impact of these animal transfers is widespread (Kristjanson et al., 2004). However, despite the obvious importance of livestock in Africa, few studies have quantified the impact of livestock as a tool for improving food consumption, and there is no work that considers the particular significance of livestock under women's control.

I use data from the Copperbelt Rural Livelihood Enhancement Support Project (CRLESP). The data were collected in January and August 2012 to address this gap in the literature. The CRLESP is implemented by HPI in the Copperbelt Province of Zambia; an area with generally low populations of livestock (Lubungu et al, 2012). Working through women's groups, the project is providing households with draft cattle, dairy cows and goats. The implementation of the CRLESP implies that equally qualified households receive livestock at different times. This rollout creates a natural experiment in which some households are 'treated' with livestock while otherwise similar households are not. Against this background, I seek to examine the impact of livestock ownership on income changes, and then to assess whether livestock has a unique impact on consumption patterns. Finally, I analyze the gendered aspects of the impacts of livestock on income and consumption patterns.

From an agricultural development policy perspective, it is important to analyze consumer behavior to explain the level of demand for commodities given real incomes and individual characteristics and preferences. According to DeJanvry and Sadoulet (1994), knowledge of consumer behavior can assist in defining policy interventions to improve the nutritional status of individuals within a household. In our case, if there is a particularly strong impact of livestock-based income on food consumption, one could argue that livestock development is a particularly effective mechanism for addressing some forms of food insecurity.

The hypothesis that income from different sources is used differently is informed by several studies that have shown varying expenditure patterns depending on the source of

income. In a region with little animal agriculture, and where farmers rely mostly on annual crop income, the Copperbelt province provides a unique opportunity to test the impact of livestock. In addition, several studies have documented that income earned by women tends to be used to improve household welfare, compared to income earned by males. This thesis provides a unique analysis of the impact of livestock income on household expenditures and the gendered aspects of livestock.

My sample is divided into a treated and control groups, in which the treated group is comprised of households that received income from animals from HPI. The control group consists of households that have applied to receive assistance from HPI and are considered eligible, but have not yet received animals or training due to HPI's capacity constraints or have received animals too recently to enjoy any output or income from them. This control group is considered similar to the treated group in that the members have self-selected to participate, but these households are currently rationed out of receiving livestock. The control group can be divided into households in control communities that are geographically sufficiently removed from the treated communities to limit concerns of spillover effects and those who are in recipient communities and may experience spillover effects even though they have not received animals.

I carry out the following analyses. First I conduct an analysis of the impact of livestock receipt on total expenditures. Next, I present non-parametric regression results of the food shares for treated and control groups on the logarithm of total per capita expenditures at baseline and follow-up. Expenditure behavior may vary due to differences in factors such as demographic variables, geographic region and

characteristics of the household head. Thus, I define a model in which these household characteristics are allowed to affect both the slope and intercept of the Engel curves. The parameters of the share equations are estimated for each commodity group using Seemingly Unrelated Regression techniques. I also carry out robustness checks on the results by introducing various model specifications and alternative control and treatment groups.

The rest of the thesis is organized as follows. Chapter 2 presents a review of research that has examined expenditure patterns and household welfare, livestock and gender issues in agricultural production. Chapter 3 discusses the model used in the study and the data used in this analysis. Chapter 4 is a discussion of the findings from the analysis and Chapter 5 is the concluding chapter that highlights key findings, limitations of this study and the scope of future work.

Chapter 2

Literature Review

In an effort to fight poverty and improve household welfare, many developing countries have promoted rural development through the implementation of projects aimed at increasing and diversifying rural incomes. Numerous studies have sought to analyze the effect of income from different sources on various measures of household welfare. In addition, intrahousehold allocation of resources has been critically examined as studies have shown differences in household budget allocations based on the gender of the person controlling income. While most of these analyses refer to the importance of crop income and remittances in the developing world, there is much less literature on the livelihood effects and gendered aspects of livestock (Alary, 2011).

Importance of livestock in Africa

Livestock plays an important role in much of rural Africa where an estimated 50% of the population lives in poverty (World Bank, 2013). The number of poor people who depend on livestock for their livelihoods is not known with certainty, but the most commonly cited estimate is 987 million or about 70 percent of the world's 1.4 billion poor people (World Resources, 2005). In most countries in Africa, over and above providing meat and milk, livestock serve multiple purposes, especially in rural areas where livelihoods are heavily reliant on agriculture. First, to facilitate inter-seasonal consumption smoothing, households tend to invest in animals after the harvest season and

sell them for cash or grain when their food stores run out. Livestock are thus expected to yield a positive expected return to investment and provide risk diversification benefits.

Second, livestock provide a means of saving for major recurring expenses and act as a form of a shock absorber. A study by Ishagi et al. (2003) in Kampala shows that urban populations use livestock as a saving tool especially in times of political and economic upheaval, providing some evidence to the saving function of livestock in both rural and urban areas. In a paper that examines the impact of drought on adult health in rural areas of Zimbabwe, Hoddinott and Kinsey (2000) find that the accumulation of livestock protects women against the adverse consequences of this shock using the body mass index as the outcome of interest.

Social currency is another important role played by livestock in many countries in Africa and beyond, where animals are used in ceremonial activities and religious events. For instance, a husband pays a dowry to the wife's family in the form of cattle in southern African countries as a way of compensating them for the loss of her labor. Provision of either regular or occasional cash flow through the sale of animals, and raw or processed products is another role that has been instrumental in helping households to improve their food security status and nutrition. In mixed farming systems, livestock have the added function of providing manure to fertilize fields and gardens as well as provide draft power for ploughing and transport (Dorward *et al*, 2004).

According to Bennett's law, the share of calories consumed from starchy foods falls as income increases (Bennett, 1941 in Parfitt et al, 2010). Households in urban areas typically have higher incomes than rural households. The United Nations Human

Settlements Program (UN–HABITAT) reported in 2010 that Africa is the most rapidly urbanizing continent with an annual urbanization rate of 3.4% (UN HABITAT, 2010). These economic and demographic trends imply growing demand for animal products. However, despite the growing opportunities in livestock, the sector continues to be marginalized in Africa. For example, while almost every country in Africa developed Poverty Reduction Strategy Papers, only Gambia, Mozambique, Mauritania and Rwanda have proposed some appropriate strategies for the livestock sector in their PRSPs (Blench *et al*, 2003).

To better understand why countries in Africa have not placed importance on livestock, in 2003/2004, the African Union's Inter-African Bureau for Animal Resources (IBAR) consulted with senior policy makers on the constraints in the sector. One of the reasons given for the relatively substandard policy environment was a lack of information that could be used in decision-making. They pointed out that lack of quality information on the livestock sector in Africa has the effect of over-emphasizing the crop sector and fails to recognize the actual contribution of livestock to national economies as well as to rural livelihoods (AU/IBAR 2004). This has led to most government-driven food security initiatives using a bumper cereal crop as a benchmark for achieving food security. Despite the seeming lack of adequate attention to the sector, there is no denying the role it plays in poverty alleviation efforts in Africa.

Mburu et al (2012) provide evidence for the importance of livestock in a study of rural communities in West Africa. They use the sustainable livelihood framework to construct a poverty index based on asset ownership and income from other farm

enterprises as well as non-farm enterprises. Mburu et al (2012) use this index to test whether livestock ownership has any impact on the poverty status of a household. Using a Tobit regression model, their results show ownership of working animals has a significant impact on poverty alleviation as households who own working animals have draft power and can increase the productivity of their land. However, the paper fails to address problems of engogeneity, the causal relationship between working animal ownership and increased crop productivity is not fully explored.

The accumulation of livestock is widely believed to help mitigate the effects of various shocks. In a study examining the impact of droughts on the body mass index (BMI) for adults in rural resettlement areas of Zimbabwe, Hoddinott and Kinsey (2000) show evidence of the shock-absorbing role of livestock. Their results show an association between drought and a reduction in BMI for women but not men. Furthermore, increases in the value of lagged livestock holdings increase women's BMI and not men's. Their study suggests that accumulation of livestock serves as a risk-mitigating strategy as the value of livestock is usually stable or increasing.

Kristjanson, Krishna, Radeny and Nindo (2004) used a community-based methodology to determine the various pathways out of poverty for rural farmers in Kenya and the role of livestock in the process. In focus group discussions in a total of 20 villages, the farmers defined a household's progression out of poverty, with households saying that additional income is almost always spent on food. In the same study, of the households that had escaped poverty during the last 25 years, about 42% cited diversification into livestock as the major reason for their escape from poverty (Table 1).

The poverty lines used in the study are as constructed and perceived socially by the community members. This study shows that it is socially perceived that livestock can help bring people out of poverty but as in other studies, the direction of causality in relationship between livestock and poverty is not verified.

In a study very similar to mine, Pimkina *et al* (2013) use data from an HPI project in Rwanda to analyze the impact of the project on dietary diversity and child nutritional attainment. Using Propensity Score Matching (PSM), they match the treated households to the un-treated ones on observable household characteristics. As expected, their results show that the program increases dairy and meat consumption among the treated group. In addition, for the households that received goats they find marginally statistically significant reductions in wasting among children under 5 years old. There were reductions in stunting among children in households that received dairy cows. Their analysis, though underscoring the role of livestock in improving welfare has a number of weaknesses. First, there is no baseline survey to help them better isolate the program effects. In addition, they use a control group that is resident in the treated communities and do not account for spillover effects.

To underscore the importance of livestock, a paper by Pica-Ciamarra *et al* (2011) uses data from the FAO Rural Income Generating Activities (RIGA) database for 12 countries. The study notes that income from livestock is typically difficult to quantify, with the value of total production commonly used as a proxy. Irrespective of the way livestock income is estimated, they show that the direct contribution of livestock to total income of rural households is on average 12 percent, ranging from 2 to 24 percent in the

countries of interest. They conclude that increasing the productivity and profitability of livestock should directly contribute to the livelihoods of the majority of rural households who keep livestock.

Zambian context

Zambia is a landlocked country in southern Africa and is considered to be one of the poorest countries in the world, with 77.9% of the rural population living below the national poverty line. About 36% of the country's population lives in urban areas and the literacy rate, defined as the people over the age of 15 who can read and write English is 80.6% (The World Factbook, www.cia.gov). Zambia's economy depends on its copper mining sector, making the country vulnerable to price fluctuations.

Zambia's agriculture sector

Of the total land area of Zambia, only 4.5% is arable land and yet, 72.2% of its population relies on agriculture for their livelihoods. In addition, agriculture is predominantly subsistence, and this increases vulnerability to droughts and other environmental hazards. The agriculture sector constitutes 20.2% of the country's GDP with tobacco, flowers and cotton as the major exports. Approximately 78.9% of women are employed in agriculture, making the sector an important one in terms of gender analysis. The sector is characterized by a rainy season that runs from November to April and a dry season from May to October. The rainy season coincides with the main harvest

period, and most households in rural Zambia tend to grow corn, the staple food, for household consumption and they sell the surplus.

Livestock sector in Zambia

A study by the Indaba Agricultural Policy Research Institute of Zambia (Lubungu et al, 2012) shows that there has been a gradual increase in livestock populations between 2001 and 2008. However, there continues to be uneven distribution in the livestock populations across the country. They estimate that more than 50% of the country's livestock populations are in the Southern province and there are generally low populations of livestock in the Copperbelt province, where this study is situated. Lubungu et al (2012) point out that the government of Zambia has made efforts to address livestock issues in its Sixth National Development Plan (SNDP), placing importance on livestock marketing challenges to address problems of food insecurity through increased incomes and employment creation.

Household theoretical models

This thesis is based on the conceptual model that allows the recipient and the source of income to affect household consumption patterns. It is therefore rooted in a collective model of the household. For a long time, household analyses used the unitary model that assumes that households maximize a single utility function subject to a single budget constraint, with no regard to who was earning or controlling the income. However, tastes and preferences differ based on characteristics such as age, gender and race. Within a

household, different resources might be allocated according to different members' preferences rather than following a single utility function. Following the criticisms of the unitary models, a variety of collective models that assume that male and female incomes will not necessarily be allocated in the same way were proposed. Several studies have conducted tests of the unitary household model and rejected the notion of income pooling or identical preferences. Instead of the unitary model, recent research has focused more on a variety of collective bargaining models (Quisumbing and Maluccio, 2003; Phipps and Burton, 1998; Thomas, 1997; Hoddinott and Haddad, 1995).

One type of the collective models is the 'Pareto-efficient' model that assumes separate utility functions, but posits that household members work together to choose an *efficient* allocation of resources. In these collective models, the gender of the person earning or controlling income matters as the contribution of one member to total income may influence their total share (Phipps and Burton, 1998). Theories of household behavior become especially important for joint households where the distribution of power within the household affects resource allocation within the family as discussed by Doss (2005) in a study of rural households in Ghana. The paper supports a myriad of other studies that agree that household resources are allocated in the face of competing preferences and unequal bargaining power among members of a household.

McElroy and Horney (1981) describe household behavior as being similar to the Nash bargaining game where members have separate utility functions but observed resource allocation patterns depend on the bargaining power of the individuals. The collective bargaining models form the basis for research on intrahousehold allocation of

resources. These models show evidence that who controls the income within the household has implications on the observed expenditure and consumption behavior of households.

In addition to measuring the effect of the gender of the person controlling income, this study also seeks to measure the impact of income from livestock. There have been a number of studies that have analyzed the impact of income from crops, non-farm activities, and remittances on the welfare of the household. These studies are discussed in detail in the next section.

Does the source of income matter?

If financial markets were complete and costless, income from any source would be treated equivalently. Given high cost or missing markets, the source and timing of income could influence spending. Economic theory suggests that when financial markets are complete, individuals tend to consume only the permanent portion of their income and save any transitory positive earnings (Barrett, Reardon and Webb, 2001). With incomplete financial markets in Africa, it becomes important to analyze how income from different sources affects household welfare. Numerous studies have focused on the impacts of income from various sources such as remittances, cash crops and non-farm activities on the welfare of a household. Masanjala (2006) investigates the efficacy of cash crop liberalization as an instrument for poverty alleviation. Cash crops earn higher value than food crops, and growing cash crops allows a household to earn higher incomes than if they had used the same resources to grow grain crops. Using a latent welfare

model, he finds that households that grew cash crops had higher incomes than household that did not. These households also significantly increased their food purchases though he finds that the increase in food purchases was not matched by a significant increase in per capita food intake. Cuong (2009) also discusses the effects of crop income on expenditures in Vietnam and finds that cash crop income has a significant impact on per capita household expenditures.

With official international remittances estimated at about $93 billion per year (Ratha, 2004) and gaining importance, there has been an increase in the number of studies that have aimed at analyzing the poverty impact of these cash transfers in developing countries. One such study by Adams (2005) analyzes how remittance income affects household expenditure in Guatemala. Adams finds that households receiving remittances tend to spend less on the margin on food than non-remittance receiving households and they also spend more on housing.

Arguing that income from different sources induces varied expenditure patterns among households, Schady and Rosero (2007) use local and international remittance income in Ecuador in their analysis to explore this notion. Not only does their paper show the effects of income from remittances on food shares, they also show that the gender of the person receiving the income matters in the household's consumption decisions. They show that women have a preference for food, and that the increase in the food share reflects the increasing bargaining power that women have as a result of having more income.

The papers cited above have shown that income from different sources is expected to induce varied expenditure and consumption choices within households. While most of these analyses refer to the importance of crop income, there is much less literature on the livelihood effects and gendered aspects of livestock (Alary, 2011). As discussed previously, livestock has many different functions in Africa. For many, it is a wealth and status symbol and also acts as an income buffer where households can receive income from livestock at any time of the year. In addition, this study posits that the gender of household member earning and controlling income also leads to varied expenditure choices due to differences in preferences between men and women. The next section discusses why gender matters in household welfare analysis and discusses studies that have analyzed the gender effects in expenditure patterns.

Gender issues in agriculture

Why gender matters

Female-headed households have been stereotyped as the 'poorest of the poor'. Many researchers have concluded that women experience a higher incidence of poverty than men, suffer a greater depth or severity of poverty, are prone to more persistent long-term poverty and face more barriers to lifting themselves out of poverty (Chant, 2007). However, women make significant contributions to the rural economy in developing countries. Women comprise 43% of the agricultural labor force in developing countries; specifically in Zambia, the female share of agricultural labor force is greater than 40% (FAO, 2012). An extensive study of the 600 million poor livestock keepers in the world

showed that around two-thirds are women and most live in rural areas (FAO, 2011a; Thornton et al., 2002).

In agrarian societies, women tend to have control of chickens and small ruminants whilst men control the larger livestock. Njuki et al (2011) use data from Malawi and Uganda to show that commodities generating lower average revenues are more likely to be controlled by women than men. FAO (2012) estimates, if women had the same access to productive resources as men, they could increase yields on their farms by 20–30 percent. This increase could raise total agricultural output in developing countries by 2.5–4 percent and reduce the number of hungry people in the world by 12-17 percent, up to 150 million people.

As with many gender studies, defining what constitutes a female-headed household has implications on the interpretation of findings and the theoretical framework. Households tend to be solely male-headed, solely female-headed or joint headed; hence questions of control of income, ownership of productive resources and aspects of decision-making within the households become important in determining headship and control (Covarrubias et al 2012). The International Labor Organization (ILO) defines a female-headed household as 'a household where either no adult males are present, owing to divorce, separation, migration, non-marriage or widowhood, or where men, although present, do not contribute to the household income' (The ILO Thesaurus, 2011). In this study, the survey respondent was asked to identify the head of their household and no guidance was provided as to how to define the head of the household.

In an extensive paper that discusses the constraints women face in access and control of productive resources and further highlights the intervention strategies to address the constraints, Quisumbing and Pandolfelli (2009) do not include livestock as an important productive resource that can help address the needs of poor women in Africa. They note that increasing resources controlled by women could promote increased agricultural productivity, further discussing the need to pay attention to the interaction between economic factors as a way of closing the gender gap and yet make no mention of one of the most important productive resources; livestock. Their discussion focuses on land, water, labor, credit and access to markets, among other interventions. Since inequality and control of livestock is well documented and the contribution of livestock is also well known, this exclusion of animal resources from the gender discourse is an important weakness to address through research.

The studies above have all shown that gender inequalities do exist and women often do not control productive resources. However, in instances where they do have control, women make significant contributions to household welfare. Control of productive resources, such as livestock, by women implies that there is a difference in the way income from various sources is used in the household.

Empirical findings in gender and household expenditure patterns

Are there observed differences in expenditure patterns based on the gender of the household head? Subramanian (1991) uses household expenditure data to analyze the gender effects in Indian consumption patterns and finds that there are substantial gender

effects in the consumption of some goods; however, he notes that there were many cases where gender effects were expected but not found. He uses an Engel curve formulation first suggested by Working in 1943 that allows budget shares to be linearly related to the logarithm of total expenditures. In his model, he allows household size to directly affect budget shares and concludes that the evidence from the study does not provide a conclusive test for gender discrimination in the expenditure patterns.

In contrast, Phipps and Burton (1998) find conclusive evidence of gender discrimination in expenditure patterns. Using data from Canada, they use Engel curves to test the hypothesis that an additional dollar of male income is spent in the same way as an additional dollar in female income. They reject the hypothesis for eight of their fourteen consumption categories. For instance, they find that an extra dollar of the wife's income was more likely to be spent on child-care than an extra dollar of the husband's income. In addition, they find that they cannot reject the income-pooling hypothesis for some expenditure categories.

Maitra and Ray (2005) use intra-household balance of power to examine the impact of gender on expenditure patterns using data from Australia. Using a collective approach to household behavior, they model household utility as the weighted average of individual household members. The weights are indicative of the individual member's relative bargaining power and these weights are endogenously determined. Their results show some relationships between relative power and budget shares for some commodities. The paper makes important conclusions; that the bargaining power of an

adult member of the household has an effect on the expenditure patterns and rejects the income-pooling hypothesis of the unitary model of household behavior.

Hoddinott and Haddad (1995) use non-cooperative game theory to describe household behavior, where in the end, households may not be efficient. In their case study of Cote D'Ivoire on whether female share of income influences household expenditure patterns, they use a non-bargaining model of household expenditures and conclude that raising women's share of income does have a positive effect on expenditures, especially on the food budget. These results show that gender bias is measurable in some categories of spending and not others. Poor households where women control the income tend to spend a larger share of income on food and education and a smaller share on goods such as alcohol compared to other households.

Quisumbing and Maluccio (2003) use assets at marriage as an indicator of bargaining power to assess the impact on household spending patterns and education outcomes. Their study uses the Engel curve approach using data from four countries, Bangladesh, Ethiopia, Indonesia and South Africa. They find that increasing relative resources controlled by women leads to higher expenditure allocations to education.

The discussion on bargaining power is furthered by Doss (2005) who found that women's share of assets has an impact on household budget share in her study of rural and urban households in Ghana. In her analysis, assets included business assets, savings and farmland but she notes that "additional information would have been useful in analyzing the effects of intra-household property ownership", especially mentioning the importance of including livestock assets. In her model, women's bargaining power,

location, income and household structure are expected to affect household expenditure.

The income measure used is an aggregate one for all farm and nonfarm enterprises and

she uses the percentage of assets owned by women as a measure of women's influence in

decision-making. She uses a cooperative bargaining model where each adult household

member has a separate utility function, concluding that households should not be treated

as single economic units but that bargaining power and individual preferences should be

incorporated in a cooperative model. The percentage of assets owned by women is used

as a proxy for a woman's bargaining power; she uses this as a way of dealing with

endogeneity when analyzing the effects of bargaining power on the expenditure patterns.

Estimating reduced form equations for expenditures from a Nash bargaining problem, her

results suggest that the share of assets owned by women affects expenditure decisions of

households. Her analysis cannot be replicated in this study because of lack of data on

prices and ownership of assets.

    Schady and Rosero (2007) explore the question on whether cash transfers made to

women are spent in ways similar to income from other sources. The study uses data from

the *Bono Solidario* program in Ecuador where the government made small cash transfers

to poor households and beneficiaries were randomly selected into treatment and control

groups, a program design feature they used to control for endogeneity. Their analysis

started with nonparametric regressions where they show the food Engel curves to be

similar at baseline for the treated and control groups. Using both data from the baseline

and a follow-up survey, they use a Working-Leser model that allows for the program to

have an effect on the intercept but not the slope of the Engel curve. The model linearly

relates the budget shares to the logarithm of total expenditures. Considering the pre-existing differences between the treatment and control groups that remain despite the random assignment of the program, they perform regressions in first differences that show the changes between baseline and follow-up. The study finds that the food share at follow-up was between 1.7 to 2.5 percentage points higher among the treated group than the control group. Furthermore, they conclude that the bargaining power of women improved after they received transfers and that women were then better able to influence expenditure patterns of the household.

Measuring expenditure patterns

Adams (2005) also uses the Working-Leser model to analyze how remittance income affects household expenditure in Guatemala. Unlike Schady and Rosero (2007), Adams (2005) does not have an explicit gender focus. The model choice stems from the fact that linear Engel curves do not allow the marginal budget share to vary. In his model, Adams runs a set of OLS regressions for budget shares from six commodity groups, linearly relating the budget shares to the log of total expenditure and demographic control variables. This study replicates the analysis done by Adams using dummy variables for a household receiving livestock income from cattle or goats to assess if expenditure patterns vary among households with livestock income and those that do not have livestock income.

Hendricks and Lyne (2003) analyze the expenditure patterns and elasticities of rural households in South Africa in order to determine the potential impact of a widespread

income shock on household expenditure. Using the Working-Leser model, they estimated the absolute budget shares (ABS), marginal budget shares (MBS) and expenditure elasticities for each commodity group; where the ABS measures the percentage of income going to a commodity group and the MBS measures the direct impact of income changes on the consumption of a group of goods (Delgado et al, 1998). Their results do not show marked differences in expenditure elasticities between study districts or between different wealth groups. As expected, the elasticities estimated for food were close to unity.

To answer the question of whether demand patterns and expenditures vary across regions and income groups, Abdulai (2002) uses quadratic Almost Ideal Demand System (QUAIDS) to analyze data from the Swiss Household Expenditure Survey. He also replicates his analysis in a study using data from Tanzania and in both studies, concludes that expenditure patterns differ by income group. This result is further supported by Bopape (2006) who uses the same model for South Africa and finds that for urban households, a 1% increase in total food expenditure increases the budget share of grains by half a percentage, compared to 1.12% increase in rural areas. Despite allowing for demographic effects in the model, a lack of price data in this study does not allow for the use of the QUAIDS model.

Despite a plethora of studies on gender and food expenditures, there remains a dearth in literature on the contribution of livestock income to livelihoods. The studies cited agree in theory that income received by men and women is usually used differently because of differing tastes and preferences, however, the studies placed importance on

other sources of income such as crops, remittances and credit. Though mentioning livestock as an important livelihood source, these studies fail to single out the effect of this asset on livelihoods, either due to lack of data or just simply not prioritizing this source of income.

Crucial questions on the share of livestock income to total household income, the flow and control of this livestock and its potential in alleviating poverty, especially during the dry season remain largely unanswered. There is largely still a gap in literature on the contribution of livestock using household level data. Gendered aspects of income are even less common in literature. My study will contribute to filling this gap by providing evidence that not only does the source of income matter, but the gender of the person controlling the income matters. I achieve this by combining the questions and methods used by Quisumbing and Maluccio (2003) and by Adams (2005). Where the former focuses on the impact of the gender of the person controlling the income on household welfare, the latter focuses on the source of the income in determining consumption patterns. I seek to answer the following questions:

1. What factors influence the expenditure patterns for food and non-food commodities?

2. Does livestock income affect the expenditures and consumption patterns for the various commodity groups consumed by households?

3. Is the effect of livestock income different when women control the livestock?

The study will use the semi-log formulation of Engel curves, also known as the Working-Leser model that allows budget shares to be linearly related to the logarithm of total expenditures. I will run Seemingly Unrelated Regressions for each of the six budget shares in my analysis. I carry out robustness checks using different model specifications and alternative control and treatment groups. To control for endogeneity of livestock income, the study argues that livestock ownership in the study area is exogenous. Households that own livestock choose to participate in the program, out of their own volition and the program is open to anyone in the community. All households in the dataset have self-selected for livestock, but only a subset received the animals. Therefore, households in the analysis are exogenously selected into ownership of livestock.

Chapter 3

The Model and Data

The purpose of this study is to estimate the income-consumption relationships for various commodity groups and establish how these relationships are affected by changes in income and household demographic characteristics. Specifically, the study tests if these relationships are different when the income is from livestock or when women have influence on income earning decisions. Total expenditures are used as a proxy for income as expenditure data is generally believed to be more reliable than income data.

Consumption has been widely regarded as a better indicator of welfare than income for of a number of reasons. First, consumption is arguably more closely related to a household's welfare while income is simply a means to consumption. Second, consumption may be a better indicator of a household's ability to meet its basic needs. In a way, it gives a more accurate picture of the actual standards of living achieved with the current income. This is especially important in a rural agrarian community where income tends to fluctuate during the year. The third reason is that these poor communities tend to have erratic income that comes from different sources and in small amounts, increasing the chances of measurement errors for income (The World Bank, 2005). Despite these advantages of consumption as a welfare measure over income, there are disadvantages that come with measuring consumption levels. The most important of these is inconsistent conversion of weights of grain and other food items to conventional measures such as kilograms.

To analyze the income effects on expenditure patterns, a flexible functional form is required where the slope of Engel curves is allowed to change with income. The linear Engel curve is represented by the following equation:

$$E_i = \alpha_i + \beta_i E \qquad (1)$$

where E_i is expenditure on commodity group i, E is total expenditure and α_i is a constant. This formulation does not allow the marginal budget share β_i to vary at all (Hazell and Röell, 1983). A variant[1] of the Working-Leser model, relating budget shares linearly to the logarithm of total expenditure, is chosen and takes the basic form:

$$w_i = \beta_i + \frac{a_i}{E} + \gamma_i (\log E) \qquad (2)$$

Where w_i is the expenditure share on good i, or commodity group i, E= total expenditure and a is a constant. Equation (2) is equivalent to the Engel curve:

$$E_i = \alpha_i + \beta_i E + \gamma_i E (\log E) \qquad (3)$$

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[1]This is a variant of the Working-Leser model because it includes the intercept in equation (3). According to Hazell and Röell (1983), the restriction that E_i should be zero whenever E is zero should be built into the model. However, observations with zero E lie outside the sample range. They conclude that observing this restriction can lead to poorer statistical fits.

To allow comparison of expenditure behavior of households with different sources of

income, the model is expanded to allow differences in household characteristics to affect

both the slope and the intercept of the Engel curves. The reason is because part of the

observed differences in expenditure behavior may be due to factors such as family size,

education of the household head, geographic region and asset ownership. Including the

income share controlled by a specific household member in the Engel curve equations

could act as an empirical test between the unitary and collective models where if the

effect of income share by gender is significantly different from zero, the income-pooling

hypothesis of the unitary model is rejected. The model is estimated in share form to

mitigate potential heteroskedasticity problems. These problems arise from rising

variability in E_i when total expenditures increase in cross-sectional data. However, a

typical problem of estimating share equations is that the R^2 values are small (Hazell and

Röell, 1983). Data from the first and second surveys of the project are combined to form

a panel dataset and budget share equations are estimated using SUR, where the equation

used in the study is as follows:

$$w_i = \beta_i + \frac{a_i}{E} + \gamma_i (\log E) + \sum_j [(u_{ij})Z_j / E + \lambda_{ij} Z_j \qquad (4)$$

Where Z_j denotes the vector of the jth household characteristics over the two time periods

of survey data. This functional form allows for nonlinear relationships between

consumption and income. From equation (4), the complete model to be estimated is as follows:

$$w_i = \beta_i + \frac{a_i}{E} + \gamma_1 (\log E) + \gamma_2 (INCOMESHARE_L) + \mu_1(CHILD6) + \mu_2(CHILD16) +$$

$$\mu_3 ADULTS + \mu_4 EDUHH + \mu_5 BP + \mu_6 COMTYP + \delta_1 ROUND2 + \delta_2 Interactions +$$

$$\varepsilon_i$$

Where w_i is the expenditure share on good i, and $\log E$ is the logarithm of total expenditures. $INCOMESHARE_L$ is the share of income from livestock, with cattle and/or goats being the livestock of interest. *CHILD6* is the number of children under the age of six, *CHILD16* is the number of children between the ages of six and sixteen and *ADULTS* represents the number of adults in the household (those older than sixteen). The *EDUHH* variable is the education level attained by the head of the household. The *BP* variable is the proxy of women's bargaining power, measured by the number of decisions women make unilaterally or jointly with a spouse. These decisions are representative of a total of 13 areas in which women can make decisions or control productive resources such as land.

The binary variable $COMTYP$ shows whether a household is resident in the treated community or not. The households in the treated community have either already received an animal or are in line to receive one. The variable takes the value of 1 for a household in the treated community and 0 for the control communities. *ROUND2* is a binary

variable in the panel data that takes the value 1 for Round 2 data and 0 for Round 1 observations. In the base regressions, I also interact the bargaining power variable with the data round dummy to single out the effect of the bargaining power variable in Round 2.

Economic theory does not provide any guidance on the number or composition of commodity groups; hence this decision is usually made on an ad hoc basis by the researcher. In this study, commodities will be categorized as follows: food, durables, clothes, education and healthcare and household maintenance[2]. Goods are clustered in these groups because they are likely to have similar responses to income changes or can be assumed to be reasonable substitutes for each other. The livestock of interest in this study are dairy cows, draft cattle and goats and ownership of these animals is taken as exogenous in the model. As explained latter in the chapter, households receiving these animals from the Heifer project make a choice to participate in the program and to invest time, money and labor before they receive the animals. It is argued that the households who are not program participants have different preferences, reflected in their decision not to participate.

The data

This analysis uses data from the Copperbelt Rural Livelihoods Enhancement Support Project (CRLESP) in Zambia. The project is implemented by a non-profit

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[2] See table 2 for the individual items in each group

organization, Heifer Project International Zambia (HPI) with funding from Elanco Animal Health. According to the research plan, 300 households were to be interviewed, starting in January/February 2012 and every six months afterwards for a total of four rounds of surveys. This study makes use of the baseline and the first follow-up survey

The panel study was carried out in order to provide quantitative economic analysis of livestock's impact on malnutrition, poverty and economic development in a low-income country such as Zambia. In addition, it is expected that the study will address the dearth of literature on the impacts of livestock on livelihoods. The data were collected from five communities in rural areas of the Copperbelt Province of Zambia. Three of these communities have received animals from HPI, Kamisenga, Kaunga and Kanyenda. Chembe and Mwanaombe are communities that are similar on observables with the treated communities that form the control group for this study. Within these two communities, groups have been formed and have applied for assistance from HPI, demonstrating similar cohesion and organization as the treated communities. However, they have not received assistance due to HPI's capacity constraints. Similarly, within the treated community only a subset of selected households received animals. These households in treated communities are yet to receive animals and form another control group for the study. The implementation design employed by HPI allows for a controlled natural experiment, adding to the uniqueness of the study.

The initial recipients, known as the original recipients, receive 1 pregnant dairy cow, two draft cattle or seven goats, depending on the area where they reside. Households in Kamisenga received dairy cows, households in Kaunga received draft

oxen, and households in Kanyenda received goats. Households in the control areas of

Chembe and Mwanaombe are expected to receive dairy and draft animals in the future.

The original recipients then pass on the first female offspring to other households who

are classified as 'Pass on the Gift' (POG) households. However, some households within

this group may not receive animals during the period of this study. Moreover, while the

"Original" households receive pregnant animals, the POG households receive immature

livestock. The four groups in this study are the original recipients, POG, non-participants

(independents) in the recipient community and the prospective participants in the control

areas.

A total of 324 households were interviewed at baseline and 313 households were

interviewed during the first follow-up survey. The attrition was low at 3.4% between the

first two rounds of data collection. Attrition is likely to introduce estimation biases if it is

correlated with treatment status (Angrist, 1997). It was expected that attrition would be

higher among the group known as the independents as these households are not going to

receive any animals from HPI and have shown their non-interest by not joining the

community groups. Data shows that out of the 11 households that were not interviewed

in the follow-up survey, 6 are POGs, 4 are independents and 1 original recipient.

Reasons for not participating in the follow-up ranged from no longer being interested in

participating in the survey to enumerators not finding any adults at home on several

occasions.

The HPI model

Through active community engagement, HPI works with rural communities in Zambia to provide livestock and training services on various livestock and livelihoods related topics. Organized community groups submit applications to HPI and they become eligible for assistance through participation in training activities as well as making initial investments into construction of structures for the animals and making payments into a community level insurance fund. The communities identified as eligible by HPI are similar on observable characteristics. Eligibility at the individual level is determined by becoming a member of the organized community group, participating in training programs, making initial investments into construction of animal shelters and insurance as well as meeting a needs-based criteria. Due to limited supply of animals, only a few people in the community can receive animals at a time. It is not clear how the selection of the few beneficiaries is carried out at the community level. As mentioned before, households who are initial recipients of animals are expected to pass on the first female offspring to another household. The HPI model thus allows for a naturally controlled experiment where households have immediate receipt of animal, delayed receipt or no receipt at all during the study period.

The program is only available in certain areas and is rolled out in the areas where it is available. This helps to reduce the problem of spillover effects. However, because training is available to anyone in the community, there are spillovers in terms of training among households residing in the treatment areas. This is not a problem for the control areas as they are sufficiently away from the treatment areas so as to not be a cause for

spillover concerns. However, the POG households in the treatment communities are expected to enjoy spillover effects before they receive animals. The program roll out allows for comparisons between households who immediately receive animals and those who will receive in the future.

As mentioned earlier, households have to make initial investments by joining an organized community group, paying into the livestock insurance fund and construct the structures for the animals. Thus, the eligibility to receive an animal from the project is endogenous. However, not everyone who is eligible to receive an animal receives one due to limited supply of animals. Communities then randomly select households who become initial recipients; these households are no different from the ones who are passed over for future receipt. This means that, for this sample, ownership of cattle and goats is purely exogenous and this experimental design limits concerns with endogeneity.

The sample

The purpose of my study is to assess the impact on household welfare of income from the animals received from HPI. The POGs and original recipients are similar, but the independents are not comparable because they have chosen not to participate. I therefore exclude the independents from my sample. In addition, I define my livestock income variable using income only from dairy cows, draft cattle and goats. Excluding income from other animal sources such as poultry allows me to isolate the effect of income from the animals received from HPI. My final sample contains 273 households, with 207 of them in residing in the treated communities and 66 in the control

communities. Of the 207 households in treated communities, 122 received animals from HPI and 51 had livestock income from those animals by the follow-up survey. My panel data thus has a total of 546 observations.

Choice of explanatory variables

Total expenditures

A household's welfare will be measured through expenditures instead of income in this study. Households often misreport total income hence using expenditures has been used as a good proxy for total income in the households. Expenditures will be broken down into shares for various categories; which are food, durables, clothes, education and healthcare and household maintenance. Total expenditures are converted to a per capita basis. The variable includes all expenditures on non-food items as well as food expenditures, which include purchased food and the value of food from own production. Food from own production is calculated using the prevailing prices at the time of data collection; these prices do not vary across the different communities. In the SUR analysis, the logarithm of total expenditures is used.

It is expected that Engel's law will hold such that as total expenditures increases, the share of expenditures spent on food will decrease. A problem that is anticipated with expenditures data arises when households purchase goods in bulk, meaning that they might not have purchased some items during the recall period. In some cases, households rarely make certain purchases. These households will appear as though they have low expenditures, when in actual in fact, the expenditures on these goods are not captured at

all (Schady and Rosero, 2007). This is possible in this sample for items such as clothes and durables. Another problem with the creation of this variable arose during conversion of local measures to the conventional ones. For instance, some households reported consuming '2 fish' or '8 small cups' of grain, making these observations difficult to convert to kilograms.

Share of income from livestock

Total income from livestock is defined as income received from the sale of live animals and from the value of home consumed milk. Again, total income is restricted to income from dairy cows, draft animals and goats. The total income from livestock divided by the total expenditures gives the share of livestock income variable. It is expected that the coefficient on the variable will be positive for the food budget share, which is the main independent variable of interest.

Bargaining power

Bargaining power is difficult to measure. Several studies have used different proxies to estimate this variable; non-labour income (Thomas 1990), income shares (Hoddinott and Haddad 1995), inherited assets (Quisumbing 2000), assets at marriage (Thomas et al. 1997) and current assets (Doss 2005). Others have also looked at decision-making and control of income and productive resources to measure how much bargaining power women have. The follow-up survey asked whether specific decisions regarding production and marketing were made by the male, the female or jointly. In this study, it is

assumed that women who participate in decision-making have greater bargaining power than those excluded from such decision-making altogether. A unilateral decision perhaps holds more weight than a joint decision; however, equal weighting has been given to both unilateral and joint decisions. Though including a joint decision may be a weaker measure of female empowerment, it allows for a broader definition of bargaining power.

A total of thirteen variables reflecting areas where women can make decisions, earn income and control productive resources are used to create this variable. The survey questions used are as follows[3]:

- Who makes decisions to slaughter cattle for home consumption?
- Who makes decisions to slaughter goats for home consumption?
- Who makes decisions to sell live cattle?
- Who makes decisions to sell live goats?
- Who makes decisions to sell milk?
- Who makes the decision to hire out draft animals?
- Who makes storage decisions for maize?
- Who makes storage decisions for groundnuts?
- Who makes decisions about selling maize?
- Who earns non-farm income from trading/marketing?
- Who earns non-farm income from own business?

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[3] See appendices 1 and 2 for the survey instruments. Most of the questions used to create the bargaining power are from Sections E and F of the surveys instruments, these sections focus on livestock, crops and credit.

- Who received credit in the household?

- Who owns the land where the household farms?

The bargaining power variable is simply a summation of the areas where women have control or ownership of resources, out a possible total of thirteen.

Household characteristics

Household composition

In order to capture some household composition effects, variables are included that directly characterize the structure of the household. Three variables are used to represent household composition: number of children under age six, children between ages six and sixteen and number of adults in the households (those over age sixteen). The household composition is important in consumption and expenditure analysis as different age groups have different preferences and different consumption levels. It is expected that the an increase in the number of children between the ages of 6 and 16 will lead to an increase in total expenditures on education. However, as income increases, the share spent on education might decrease. Some literature use adult equivalent ratios to represent family size, no attempt to derive adult equivalency was made because different equivalency scales would be needed for different food and non-food items in the analysis.

Education of the household head

Investment in human capital development is priority for governments across the world. Education is expected to shift preferences and choices to those that improve the welfare of the household and ultimately, the society at large. The education of the household head is expected to affect expenditure choices in this study, for instance, adults with more education might spend more of their income on education and healthcare for the children.

Sex of the household head

Men and women may not have equal ownership and access to resources; they can have differing bargaining power and generally have different tastes and preferences within a household. Research findings show that increased incomes to females tend to contribute more to the family well being than increased incomes to males (Maitra and Ray, 2000). These gender differences arising from social differences may help explain some differences in consumption and expenditure patterns. For instance, it is expected that women will tend to spent additional income on food, education and health. To take into account the gender effects, a dummy variable is employed, taking a value of 1 if the household head is female, 0 otherwise. The coefficient on this variable is expected to be positive for the food expenditure category.

Community dummy variable

The community dummy variable takes the value of 1 for the households resident in the treated community and 0 for the control communities. Households in the treated communities are comprised of original recipients and POGs. Those households residing in the treated communities but are not part of the project were not included in this variable. This variable allows for the isolation of community-level effects that are distinct from the direct treatment.

Descriptive statistics

Data were collected for many different food and nonfood items. The existence of zero consumption on some items for households makes it imperative to aggregate the different food and non-food items into commodity groups. All commodities are classified into six basic groups: food, education and health, durables, clothes, household maintenance and other goods. Table 2 summarizes the items that fall into each commodity group.

In terms of total expenditures, the expenditures for the Originals and the Prospectives are not significantly different from each other at the baseline. However, the Prospectives has higher average total expenditures than the Originals. The possible reason for this is the geographic location of the control communities where they are closer to the main paved roads compared to the treatment areas. Access to a main paved road increases access to other sources of income, such as small goods trading, and also ensures less transport costs to major market centers. Tables 3 and 4 present summary data

for households that received an animal from HPI and those that did not receive an animal (POG+ Prospectives). Tables 5 and 6 compare households POGs and Prospectives.

Results from Table 7 show that food is by far the most important commodity group for the households in the Copperbelt province of Zambia, accounting for about two-thirds of total expenditures in both the baseline and follow-up surveys. Expenditures on education and health account for small shares of total expenditures; at baseline they are 8.3 percent for the Originals and 5.1% for the Prospectives. The shares are even smaller at the follow-up survey. These small shares can be attributed to the households not having paid school fees during the recall period, in addition, health expenditures tend to be small as some communities are very isolated and the nearest medical clinic is at least 7 miles away. Even in communities that have a medical clinic, services tend to be heavily subsidized by the government.

Expenditures on durables were on average 14.7 percent for both Originals and Prospectives in the baseline but this number fell to 3 percent in the follow-up survey. The small budget shares at follow-up are attributable to the fact that households at this time were in the process of harvesting and marketing their crops; hence they were not yet making big purchases due to less income. Of the remaining commodity groups, there is remarkable similarity between the Originals and Prospectives in the budget shares.

At baseline, the share of income from livestock for the households that received animals was 9.7 percent. As the Prospectives did not have income from livestock, the mean for the full sample is reduced to 4.4 percent for the full sample. The share of income from livestock increased to 70.6 percent for households that received animals,

underlying the importance of livestock income for these households. As expected, there was no income from dairy at the baseline as the cows were yet to calve. Original households and the POG households have larger household sizes compared to the Prospectives. Also, the average age of the household head for the Originals is higher than that for the Prospectives. For instance, at baseline, the average age of the household head for Original households was 51.35 years against 44.4 years for the Prospective households.

Chapter 4

Results and Discussion

This chapter presents results on the impact of livestock income and gender of the household head on household total expenditure. Changes in the budget shares for the different commodity groups are used to estimate the income and gender effects. I then discuss the potential role of livestock as an engine for development and growth for rural households in Zambia.

Impact of livestock ownership on total expenditures

To motivate my discussion, I first measure the relationship between receipt of an animal and total expenditures. I run a series of Ordinary Least Squares regressions where the log of total expenditures in the follow-up survey is linearly related to the log of total expenditures in the baseline survey, livestock ownership and demographic and regional control variables. These controls include those described previously plus a measure of market access, which is the distance to the nearest market and a measure of social capital defined as the number of people who turn to the individual for help or advice. In addition, I also include the total amount of land owned by the household as a measure of wealth. The full results are presented in Table 8. The first specification shows that receipt of an animal increases total expenditures but not significantly. This weak result is not surprising as many households received goats or draft animals that had not become productive by the follow-up survey. Specification 2 includes dummy variables for

communities that are insignificant. The third specification provides interaction terms for Kaunga and the receipt of an animal, implying receipt of a draft animal and an interaction term for Kanyenda and the receipt of an animal implying the receipt of a goat. In this specification, the receipt of an animal has a positive and significant impact on income with a coefficient of 0.187, translating to a 21 percent increase in total expenditures associated with the receipt of dairy animals.

However, the negative coefficient on the interaction term between Kanyenda and the receipt of an animal completely negates the positive impact of the receipt of an animal. Thus receiving animals increases expenditures, unless the animals are goats, in which case there is no effect. The possible reason for the negative impact is that most households in Kanyenda had received goats within 3 months of the follow-up survey, with some households receiving animals even during the data collection process. Households have to construct structures for the animals, at the same time; they are not yet earning any income from the animals hence the combined effect is to reduce their total expenditures. These results confirm that there is a large effect to total income as a result of a household simply owning livestock.

I also run a series of OLS regressions where the dependent variable is the change in the total expenditures over the two rounds of data. From Table 9, results show that the analysis of change of expenditures yields similar results to the analysis of expenditure level discussed above. The results show that receipt of an animal increases total expenditures, but for households that received goats, the negative coefficient on the

interaction term between goats and the receipt of an animal completely negates the positive impact of the receipt of an animal.

Non-parametric estimation

I begin the analysis of expenditure patterns by carrying out non-parametric Gaussian Kernel regressions of the food share on the log of per capita expenditures at baseline and at the follow-up survey for both the Originals and the control group that was comprised of POGs and Prospectives. The results are presented in Figures 1 and 2.

As expected, the food Engel curves are generally downward sloping. This is a representation on Engel's law where as income increases; households tend to spend a lower share of their income on food. Due to the fact that the community exogenously selects households that receive livestock, I expect that the food Engel curves at baseline for the treated and control groups would be very close to each other. This is generally true as the confidence intervals at baseline overlap, showing that the treated group and control group are not statistically different from each other. Figure 2 shows the food Engel curve at the follow-up survey, where households in the treatment group have started to receive income mainly from milk sales. With the exception of the poorest households, households with higher overall expenditures generally have lower food shares. According to Schady and Rosero (2007), the positive slope in the food Engel curves at the lowest expenditure levels is not uncommon and can be attributed to measurement error in food expenditures. The error arises in that some households tend to buy food supplies in bulk or infrequently and would not have made certain purchases

during the survey recall period, leading to seemingly low food expenditures for these households.

In Figure 2, the food Engel curve for the treatment group is consistently above the one for the control group. Also, the difference in the Engel curves for the Originals and households that did not receive animals (POG and Prospectives) are marginally statistically different at 95 percent confidence interval for households at most income levels. This difference from the baseline, suggests that livestock income led to a shift in expenditures toward food. Thus, for programs targeted at improving the nutritional status of a household, livestock might be a good way to induce an increase in food expenditures. Incomes are increased and expenditures biased towards food.

Parametric estimation

Using the Working-Leser specification where budget shares are linearly related to the logarithm of total expenditures, I run a set of regressions using SUR for each of the 6 commodity groups in this study: food, education and health, clothes, durables, household maintenance and other goods. SUR allows the error terms to be correlated across the equations, leading to more efficient estimates than Ordinary Least Squares. The regressions were run for five equations in order to impose that the budget shares should add up to one. I include a dummy variable for the two data rounds in my regressions. The results are presented in Table 10.

In estimating the model, it is important to impose restrictions to ensure additivity, meaning that the budget shares should add up to 1. If each of the budget share equation

has a right hand side intercept and it contains the same independent variables, then the criterion of adding up is satisfied. I include a set of demographic characteristics and a regional variable in all my budget share regressions. However, including all the explanatory variables in all the budget share equations leads to the loss of degrees of freedom. These explanatory variables are selected because they are expected to affect expenditures in different ways. However, not all of them affect the different expenditure categories in the same way. This is a problem for small sample sizes such as the one used in this study. Also, the need to use the same functional form rules out fitting different functions in order to find the best fit for each of the commodity groups. (Hazell and Roell, 1983)

Results from the base regressions

Panel data from the baseline and the first follow-up survey are used. The main difference between the baseline and follow up is the increase in the number of households reporting livestock income and also seasonality as data were collected during different cropping seasons. Fifty-one households reported receiving livestock income during the second round, compared to eight households in the baseline survey. This income was mostly from milk sales and the value of home consumed milk. This rather small sample size merits some caution in interpreting the estimated effects for the variable of livestock income in the econometric model. Households that received goats generally did not have the goats generating any income yet because with the HPI model, they are only allowed to sell or slaughter for home consumption after they have passed on 7 goats to another

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family, the same number of animals they received themselves. Since these data were collected only about 6 months after these households had received the animals, they had not yet passed on to another family. Only eight households out of the seventy-three who received goats from HPI reported consuming milk from own production.

I run a regressions using model specification 1 (see Table 10) for all the six budget shares. The results show that the food budget shares obey Engel's law where the share of income spent on food decreases as income increases. An increase in income is shown to significantly decrease the food budget share, an important result for poverty studies as households are expected to use less of their income share on food as income increases and instead spend more on non-food expenditures. The source of income matters in explaining expenditure patterns. The results also show a significant coefficient on the share of income from livestock variable, suggesting that additional income from livestock tends to be used on food. A one percentage point increase in the share of income from livestock increases the income share spent on food by 2.2 percentage points.

Demographic variables in the model will affect the expenditure categories differently. Households with more children between the ages of 6 and 16 spend more on education and health, while households with more children under the age of 6 are spending more on durable goods. This is potentially because these are young families who are still amassing property for their households. The number of adults in the household and the number of children between the ages of 6 and 16 have significant negative coefficient for the food share regression but significant positive coefficient for the education and health share. It follows that a household with more school-going age

children would spend more on education for any given income level. Since the number of adults in the household was defined as anyone above the age of 16, it is possible that a household with more elderly members would tend to spend more on health or on secondary school costs as shown in these results.

The bargaining power variable is also shown to have a positive and significant effect on the food budget share. Recall that this variable measures the total number of areas where a woman owns productive resources such as land or where a woman makes decisions on the use of resources. From Table 10, for each additional area where a woman has control, the food share increases by 2.3 percentage points, indicating that increasing opportunities for women to own and control resources can help address nutrition problems within the household. Bargaining power was also significant in the regressions for the shares spent on education and health but not on the budget shares for clothes, durables and household maintenance. These results provide evidence that increasing the ownership and control of resources by women might help in diminishing food insecurity.

The results from the SUR analysis are consistent with my hypothesis that income from livestock tends to be used more on food. To test the robustness of these results, I carry out regressions using different model specifications discussed in the next section.

Different model specifications

Effects on the food shares

According to FAO (2009), the poorest households spend up to 80% of their income on food. This makes them highly vulnerable to increases in food prices and declines in income. Data shows that both recipient and non-recipient households spent on average 56% of the income on food in the baseline survey (see Table 3). These budget shares increased to 66% in the first follow up survey, potentially reflecting the scarcity of food during the dry season when the data was collected. Such high budget shares on food, coupled with a lack of a continual source of income all year round worsen food insecurity in the region. Furthermore, this has negative impacts on the welfare of the household in general, as there is less income available to spend on other areas such as education, health and purchase of productive assets. Investing in these has the potential to lift households out of poverty, but the inability to do so keeps the household trapped in a cycle of poverty.

I estimate the effect on food shares of a household having livestock income, regardless of the amount of its contribution to total income. I use a dummy variable that takes the value of 1 if a household received some income from livestock[4] and 0 otherwise. The livestock income dummy is not significant. I then interacted the livestock income dummy variable with the data round dummy and results show a significant and positive impact on the food budget shares. In round 2,having income from livestock increased the food budget shares by 9.4 percentage points. (See results in Table 11).

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[4] Income from livestock is defined as income from the sale of cattle and goats and milk only.

An increase in total income reduces the food share, but when the income is from livestock, it goes to food and increases expenditures on food. I then use the share of income from livestock as one of the independent variable and a one-percentage point increase in the share of income from livestock leads to a significant increase in the food share by 2.3 percentage points. The other demographic variables have similar effects as in the base SUR regressions.

To further measure the potential changes due to income from livestock, I perform some simulations where I note the changes to the food budget share when total income is increased by a scalar of K100, 000 and when income increases by 1%. Simulations are also carried out for changes in livestock's share of income. Increasing total income by an absolute amount increases the total amount of money spent on food, as expected, but decreases the share spent on food by almost 6 percentage points to 60 percent. In the same manner, increasing the total income by 1 percent decreases the food share by 2 percentage points. In terms of livestock income, increasing the share of income from livestock by 10 percentage points leads to a decrease in the food share by 2 percentage points.

As most of the households in the sample received income from milk sales, it was important to add a robustness check that tested the impact of income from dairy animals. I created a dummy variable that took the value of 1 when a household reported receiving income from milk sales. This variable is highly significant in round 2, increasing food shares by 11.1 percentage points, a larger impact on food shares compared to the aggregated livestock income dummy that increased food shares by 9.4 percentage points

(see Table 13 for full results). Income from milk tends to be received in small amounts daily, thus the greater tendency to spend it on immediate consumption. There are efforts by HPI to setup a system where there are local small banks at the milk collection centers, and farmers are paid for their milk deliveries at the end of each month. This not only promotes saving, but encourages more non-food expenditures.

In additional robustness checks, I tested the impact of receiving an animal on food budget shares. I interacted the receipt of animal variable with the survey round dummy and results from Table 13 show that in the follow-up survey, having a dairy animal significantly increased the food budget shares by 6.9 percentage points. The variable for the receipt of goats was negative but not significant. The results on the other variables were similar to the results from the base regressions.

Effects on education and health shares

Education and health expenditures are important, especially in a developing country context as both can provide a pathway out of poverty. I also use different specifications to test the effects of livestock income and gender on education and health expenditures. Earning livestock income did not have any significant impact on education and health expenditures. However, the community variable had a positive and significant impact on education and health budget share. A recipient household had an education and health budget share 1.8 percentage points higher than the control group in the base regressions. Recipient households have significantly higher numbers of children in the school-going age and this could explain the higher education and health budget share.

Results presented in Table 12 do not provide evidence that livestock income has any significant impact on education and health, but suggest that additional income is spent elsewhere, in this study it is spent on food. Other control variables generally have similar effects on education and health shares as in the other specifications.

Gender effects

Several studies have shown that the level of control and ownership of productive resources by women has an influence on the expenditure and consumption patterns of a household. This level of control, also known as bargaining power is shown to have some influence in this study. I have 13 areas where women could own or control resources though decision making on the use of the resources. Results show that for each additional area where women have control, the food budget share significantly increases by 2.3 percentage points (Table 10).

There are several reasons that may explain the decrease in the coefficient for bargaining power. It may be that with the influx of livestock in the communities and the availability of milk, even in households where women have less bargaining power, there is more food available due to spillover effects. Also, it is possible that seasonality affects the impact of bargaining power. Where there is less available food and income, one would expect that the bargaining power becomes more important as women have to use it to make sure that more of the income is spent on food, this would be less important when just after the harvest when food is more available. In this case, the baseline was

conducted approximately 7 months after the harvest, while the first follow-up was only approximately 2 months after the end of the cropping season.

In a different specification to test gender effects, I use the sex of the household head as one of the independent variables instead of the woman's bargaining power. The coefficient on this variable is positive and significant where the food budget shares for female-headed households are 4.1 percentage points higher than the households that are not. Furthermore, I wanted to find out if livestock income in the hands of women would have a larger effect on food shares than livestock controlled by men. To achieve this, I interacted the sex of the household head dummy variable with the livestock income dummy in Round 2. From the results presented in Table 14, specification 3 shows that women-controlled livestock income in Round 2 increased food budget shares by 9.5 percentage points.

The discussion presented in this chapter shows that livestock development might be a good way to address food insecurity as income from livestock tends to be spent more on food. In addition, results have shown that female-headed households also spend higher shares of their income on food; hence programs targeted at increasing incomes for women might help reduce food insecurity.

Chapter 5

Conclusion

Livestock plays an integral part in the agriculture sector in Africa, underscored by the variety of functions of animals, from providing food to acting as a social currency and providing manure for the cropping enterprises. This suggests that livestock are an important tool for growth and development especially in rural areas. The uniqueness of this study stems from the fact that rigorous study of livestock impacts using microeconomic data remains rare and gender analyses of livestock are even less common.

I use data from a livestock project implemented by HPI in the Copperbelt Province of Zambia. The project model allows for a natural experiment because of the staggering of receipt of animals. Using the model outlined in Chapter 3, I was able to estimate the effects of livestock income and sex of the household head on the household expenditure behavior. Results on the effects of income on expenditures generally concur with those of other studies. However, as far as I know, there is no study that has used household data to primarily conduct a gendered analysis of the impacts of livestock.

It is clear that the source of income is important in consumption and expenditure analyses. True to Engel's law, an increase in income led to a decrease in the food budget share. As households increase their incomes, the expectation is that they use less of their income share on food. This study has shown that income from livestock tends to be used on food. Specifically, income from dairy is shown to have an even greater effect on food

shares than aggregate livestock income. These results confirm that indeed income from different sources induces different expenditure choices in households.

Results from the gender analysis have useful implications, particularly for initiatives meant to address food insecurity and nutrition problems. Female-headed households tend to spend additional income on food and household welfare in general. However, I have shown that it is not merely the sex of the household head that should be considered in such analyses. In most rural areas where women generally do not control a lot of the productive resources, the bargaining power of these women has a significant effect on the expenditure choices of a household.

Overall, my study is an important step towards contributing to the literature on livestock impacts. More so because it uses quantitative household data to show that livestock has a big potential to improve food security and nutrition at household level. The impacts become even greater if livestock are in the hands of women, potentially making this a good policy direction for improving household welfare.

Limitations of the study

It was difficult to compute the total household expenditures of the households due to the varied local measures for food that are used. In some cases, food consumption was recorded as '2 fish' or '8 small cups of grain'. With no standardization and no way to accurately interpret the level of consumption, this introduced potential measurement error in the data. In addition, there were only 51 households reporting having received

livestock income in the follow-up survey, presenting the problem of a small sample size. This small sample limits generalizing the results for a larger population.

The gender analysis aspect of the study would have benefitted from additional questions in the survey that take into account the complexity of women's empowerment. The available data were mainly focused on decision making on income use and use of livestock. Additional information on issues such as women's time allocation, asset ownership and sharing of assets in the event of divorce or separation, among others. Due to the short time frame between the baseline and the first follow-up survey and the staggering of the receipt of animals by HPI, this meant that when data were collected, a sizable number of households had only received animals approximately a month prior to the second survey. This means that even though these households are recipients, it was too early to talk of any impact from the animals. Hence, results presented in this study are simply preliminary indications of the project's impact and results are not conclusive and cannot be generalized to a larger population at this time.

Future studies

This thesis provides preliminary work on the analysis of the impacts of livestock income and gender on expenditures decisions of a household in rural areas in developing countries. The most beneficial step for such an important study is a longitudinal study that will be able to capture the effects of livestock over time. Recipient households need to wait until their animals have offspring in order to start earning income from their animals because they have to fill the obligation to pass on the first female offspring.

The results of this study have shown that additional income from livestock is spent on food, suggesting that recipient household are able to buy more food but the question is on whether this change is improving their nutritional status. Since the survey is collecting data on anthropometric measures, it will be useful to compare over time if the increase in food budget shares is translating into better nutritional status for recipient households.

Lubungu et al (2012) cite the underdevelopment of rural livestock markets as one of the major constraints Zambian smallholder farmers are facing. In addition, most face challenges such as lack of good roads to access the market, and low education levels that hinder them from participating with full knowledge in the markets. It will be useful to be able to track the changes in the household over time, more importantly to track the development and growth of livestock markets in the communities.

A longitudinal study will also allow for the in-depth analysis of the impacts of draft animals as the impact of these animals is seen through the cropping enterprises of the recipient households. It might also be useful to collect price data in the future in order to capture the possibility of price differences between the communities given their geographic separation.

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Tables and Figures

Figure 1: Food Engel curves: Baseline survey
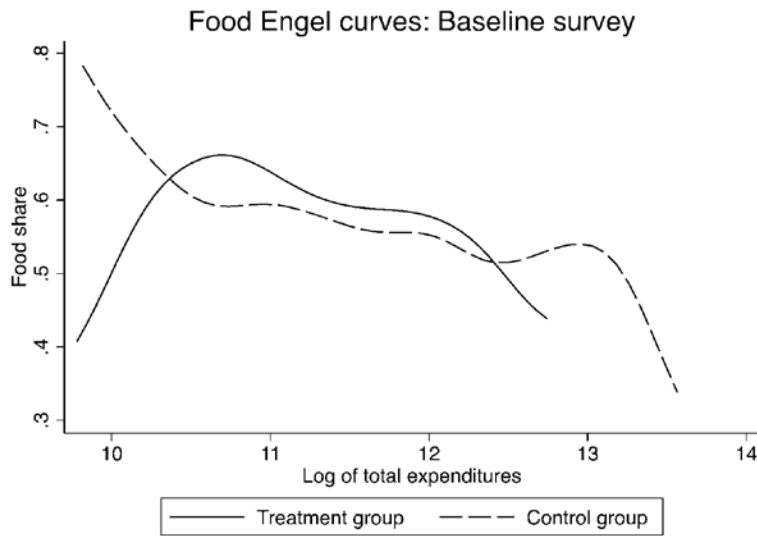
*Confidence intervals are not included on the graph as the areas for the treated and control groups[5] overlap, covering up the Engel curves.

Figure 2: Food Engel curves, Follow-up survey

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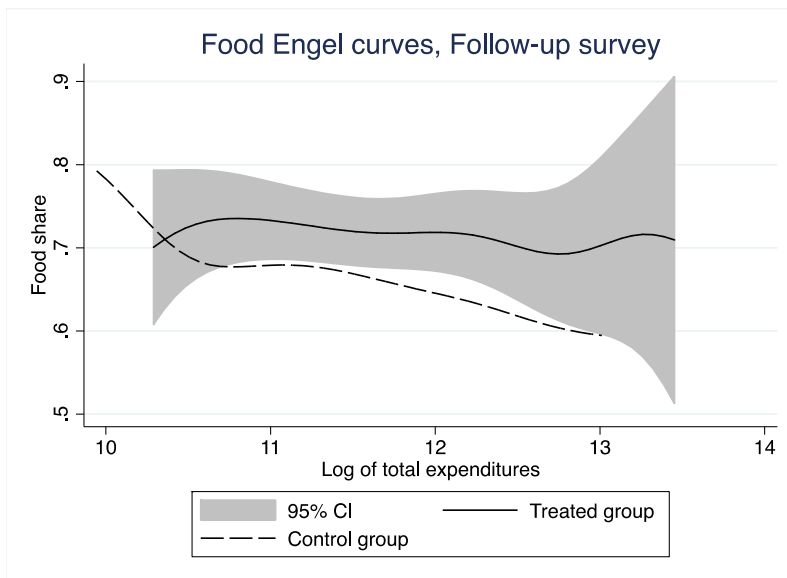
[5] The treated group is defined as households that report receiving income from livestock the HPI project. The control group is the Prospectives.

Education and health share Engel curves

Other goods Engel curves

Clothes Engel curves

Durables Engel Curves

Household maintenance Engel curves
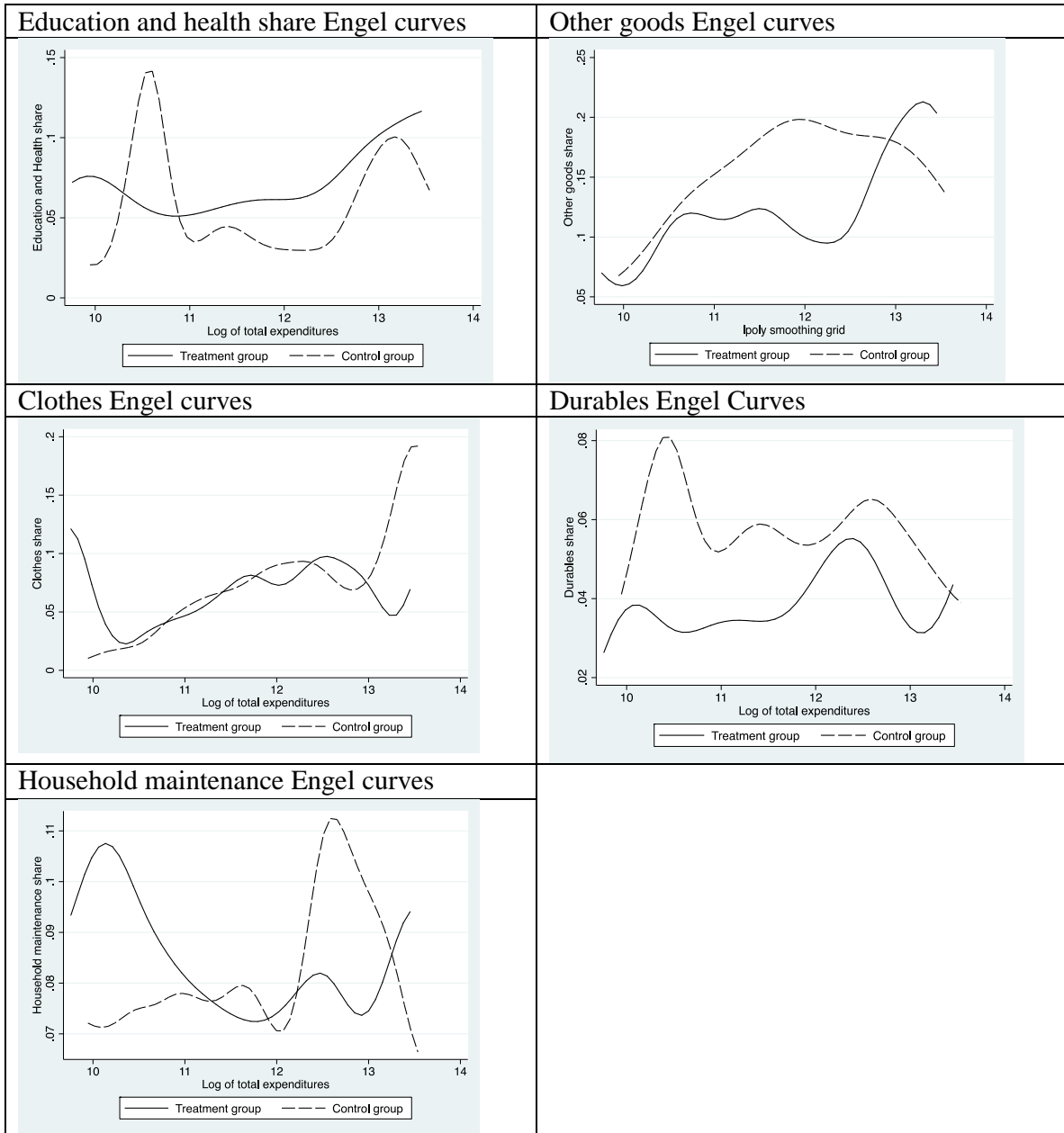
Percentage of households that had escaped poverty mentioning the reason and ranking*

Reason for escaping poverty	Overall	Vihiya	Siaya
Employment in private or public sector	73.3 (1)	68.9 (1)	83.0 (1)
Cash income from crop farming	57.0 (2)	57.1 (2)	56.6 (2)
Diversification into livestock farming	41.9 (3)	47.1 (3)	30.2 (6)
Help from relatives or friends	39.5 (4)	35.3 (4)	49.1 (4)
Petty trade/business	35.5 (5)	26.9 (6)	54.7 (3)
Small family size	33.1 (6)	30.3 (5)	39.6 (5)
Education	18.0 (7)	24.4 (7)	3.8 (8)
Bride wealth	8.7 (8)	8.4 (8)	9.4 (7)
Households escaping poverty (number)	172	119	53

*These numbers do not add up to 100 percent because more than one reason could be cited

Source: Kristajanson, Krishna, Radeny and Nindo (2004)

Category	Description	Examples
Food	Purchased food Non-purchased food	Cereals, meat, dairy products, fruit and vegetables Food from own production and gifts
Durables*	Household durables	Kitchen equipment Bedding (blankets, sheets, towels) Furniture (sofa, bed, tables)
Clothes	Consumer goods	Clothes or shoes for men, women and children
Education and healthcare	Educational and health expenses	School fees Educational materials such as uniforms, books Medicines or medical care
Household maintenance	Household services Transport and communications	Fuel (wood, charcoal), laundry, bath soap, lotions Matches, candles, batteries, torches Transport costs, telephone (Charge, airtime)
Other goods	Other miscellaneous goods	Alcoholic beverages Cigarettes or tobacco Ceremonial expenses

Notes

* Furniture was depreciated using the straight-line method to smooth the data. It was assumed that furniture had a useful life of 5 years. Since the variable had a 3-month recall period, all observations were divided by 20 months.

Table 3: Sample means and standard deviations, Baseline survey

Variable	Full sample		Received animal		Did not receive animal (POG+Prospectives)	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Budget shares						
Food share	0.561	0.175	0.559	0.171	0.562	0.178
Education and health share	0.076	0.097	0.088	0.108	0.067	0.085
Clothes share	0.104	0.363	0.077	0.081	0.126	0.483
Durables share	0.132	0.199	0.114	0.162	0.147	0.225
Household maintenance share	0.101	0.080	0.101	0.081	0.101	0.080
Other goods share	0.197	0.348	0.196	0.264	0.198	0.405
Income						
Total expenditures	134,559.2	87,338.61	131,673.3	92,113.07	136,890.8	83,519.45
Log of total expenditures	11.618	0.642	11.593	0.642	11.637	0.643
Share of income from livestock	0.044	0.432	0.097	0.644	0	0
Livestock income dummy	0.150	0.358	0.197	0.399	0.113	0.317
Share of income from dairy	0	0	0	0	0	0
Household and household head characteristics						
Number of children (<6)	1.377	1.061	1.5	1.100	1.278	1.020
Number of children (6-16)	1.872	1.461	1.967	1.493	1.795	1.434
Number of adults (>16)	3.637	1.737	3.984	1.854	3.358	1.589
Education level of household head	2.546	1.263	2.5	1.187	2.583	1.323
Bargaining power of women	1.762	1.20	1.926	1.318	1.629	1.080
Age of household head	46.39	13.32	51.35	13.43	44.40	13.31
N	**273**		**122**		**151**	

Variable	Full sample		Received animal		Did not receive animal (POG+ Prospectives)	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Budget shares						
Food share	0.660	0.152	0.663	0.156	0.658	0.148
Education and health share	0.060	0.098	0.061	0.094	0.058	0.102
Clothes share	0.069	0.070	0.065	0.067	0.072	0.072
Durables share	0.043	0.066	0.038	0.054	0.048	0.074
Household maintenance share	0.080	0.052	0.080	0.053	0.079	0.052
Other goods share	0.129	0.169	0.115	0.162	0.139	0.174
Income						
Total expenditures	141,939.1	103,545.5	142,244.9	107,153.5	141,692.1	100,894.9
Log of total expenditures	11.643	0.663	11.644	0.664	11.642	0.665
Share of income from livestock	0.317	1.035	0.706	1.459	0	0
Livestock income dummy	0.187	0.390	0.393	0.491	0.020	0.140
Share of income from dairy	0.256	0.952	0.573	1.362	0.002	0.020
Household and household head characteristics						
Number of children (<6)	1.377	1.122	1.492	1.070	1.285	1.157
Number of children (6-16)	3.187	1.990	3.443	1.945	2.980	2.008
Number of adults (>16)	3.608	1.608	3.820	1.616	3.437	1.586
Education level of household head	2.546	1.263	2.5	1.187	2.583	1.323
Bargaining power of women	1.762	1.199	1.927	1.318	1.629	1.081
Age of household head	46.42	13.13	49.09	13.29	44.23	12.62
N	**273**		**122**		**151**	

Table 5: Sample means and standard deviations, Baseline survey

Variable	Received animal		POG		Prospectives	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Budget shares						
Food share	0.559	0.171	0.571	0.189	0.550	0.163
Education and health share	0.088	0.108	0.080	0.097	0.051	0.066
Clothes share	0.077	0.081	0.152	0.640	0.093	0.080
Durables share	0.114	0.162	0.124	0.183	0.176	0.267
Household maintenance share	0.101	0.081	0.104	0.090	0.098	0.064
Other goods share	0.196	0.264	0.214	0.519	0.177	0.174
Income						
Total expenditures	131,673.3	92,113.07	129,601.4	86,019.71	146,278.8	79,850.11
Log of total expenditures	11.594	0.642	11.561	0.670	11.734	0.597
Share of income from livestock	0.097	0.644	0	0	0	0
Livestock income dummy	0.197	0.399	0.118	0.324	0.106	0.310
Share of income from dairy	0	0	0	0	0	0
Household and household head characteristics						
Number of children (<6)	1.5	1.100	1.365	1.045	1.167	0.986
Number of children (6-16)	1.967	1.493	2.106	1.559	1.393	1.149
Number of adults (>16)	3.983	1.854	3.529	1.694	3.136	1.424
Education level of household head	2.5	1.187	2.459	1.350	2.742	1.281
Bargaining power of women	1.926	1.318	1.635	1.010	1.621	1.174
Age of household head	51.35	13.43	43.92	12.08	45.03	14.80
N	**122**		**85**		**66**	

Table 6: Sample means and standard deviations, Follow-up survey

Variable	Received animal		POG		Prospectives	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Budget shares						
Food share	0.663	0.156	0.660	0.142	0.654	0.157
Education and health share	0.061	0.094	0.065	0.104	0.049	0.098
Clothes share	0.065	0.067	0.070	0.062	0.074	0.083
Durables share	0.038	0.054	0.041	0.061	0.057	0.088
Household maintenance share	0.080	0.053	0.077	0.048	0.083	0.057
Other goods share	0.115	0.162	0.116	0.117	0.170	0.225
Income						
Total expenditures	142,244.9	107,153.5	127,855.1	90,053.27	159,512.6	111,529.7
Log of total expenditures	11.643	0.664	11.561	0.624	11.746	0.706
Share of income from livestock	0.706	1.459	0.004	0.026	0	0
Livestock income dummy	0.039	0.491	0.035	0.186	0	0
Share of income from dairy	0.573	1.362	0	0	0	0
Household and household head characteristics						
Number of children (<6)	1.492	1.070	1.388	1.166	1.152	1.140
Number of children (6-16)	3.442	1.946	3.259	2.065	2.621	1.887
Number of adults (>16)	3.820	1.616	3.588	1.642	3.242	1.499
Education level of household head	2.5	1.187	2.459	1.350	2.742	1.281
Bargaining power of women	1.926	1.318	1.636	1.010	1.621	1.174
Age of household head	49.09	13.29	43.84	12.166	44.73	13.27
N	**122**		**85**		**66**	

Expenditure category	Baseline survey		Follow-up survey	
	Treated group	**Prospectives**	**Treated group**	**Prospectives**
Food	0.578	0.550	0.717**	0.654
Education and health	0.083*	0.051	0.047	0.049
Clothes	0.074	0.093	0.059	0.074
Durables	0.115	0.176	0.038	0.057
Household maintenance	0.118	0.098	0.067	0.083
Other goods	0.191	0.177	0.086*	0.169
N	51	66	51	66

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: The table shows the comparison between the treated group and the control group in the baseline survey and in the follow-up survey. The treated group is comprised of the households that reported having received livestock income.

Dependent variable: Log of total expenditures, Follow-up	Specification 1	Specification 2	Specification 3
Log total monthly expenditures, Baseline	0.388*** *(0.053)*	0.382*** *(0.054)*	0.374*** *(0.054)*
Receipt of animal variable[6]	0.088 *(0.067)*	0.135* *(0.073)*	0.187* *(0.105)*
Kaunga (dummy =1 if in Kaunga)	-	-0.024 *(0.097)*	-0.102 *(0.125)*
Kanyenda (dummy=1 if in Kanyenda)	-	-0.124 *(0.081)*	0.025 *(0.120)*
Kaunga*receipt of animal dummy	-	-	0.150 *(0.196)*
Kanyenda*receipt of animal dummy	-	-	-0.234 *(0.163)*
Number of adults in household	-0.032 *(0.021)*	-0.033 *(0.021)*	-0.038* *(0.021)*
Number of children aged 6 to 16	-0.111*** *(0.023)*	-0.114*** *(0.023)*	-0.116*** *(0.023)*
Number of children under age 6	0.021 *(0.039)*	0.026 *(0.039)*	0.029 *(0.039)*
Sex of the household head	0.002 *(0.074)*	0.006 *(0.074)*	0.011 *(0.074)*
Total land owned	0.002 *(0.007)*	0.004 *(0.007)*	0.005 *(0.007)*
Distance to nearest market	0.0002 *(0.000)*	0.0002 *(0.000)*	0.011*** *(0.003)*
Social capital	0.011*** *(0.003)*	0.011*** *(0.003)*	0.0001 *(0.000)*
Observations	311	311	311
R^2 (%)	0.3808	0.3863	0.3950

*** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses

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[6]The animal receipt variable is a dummy that takes the value of 1 for households that received an animal from HPI

Table 9: Regressions on the differences between Baseline and Follow-up: Livestock ownership impact

Dependent variable: Difference of the Log of total expenditures between Baseline and Follow-up	Specification 1	Specification 2	Specification 3
Log total monthly expenditures, Baseline	0.394** *(0.175)*	0.426** *(0.178)*	0.367** *(0.177)*
Receipt of animal variable[7]	0.348* *(0.194)*	0.295 *(0.229)*	0.617* *(0.321)*
Kaunga (dummy =1 if in Kaunga)	-	-0.140 *(0.327)*	-0.435 *(0.484)*
Kanyenda (dummy=1 if in Kanyenda)	-	0.171 *(0.262)*	0.698* *(0.363)*
Kaunga*receipt of animal dummy	-	-	0.219 *(0.650)*
Kanyenda*receipt of animal dummy	-	-	-0.937* *(0.483)*
Number of adults in household	-0.005 *(0.070)*	0.012 *(0.072)*	0.012 *(0.071)*
Number of children aged 6 to 16	-0.201*** *(0.072)*	-0.199*** *(0.073)*	-0.227*** *(0.073)*
Number of children under age 6	-0.022 *(0.102)*	-0.027 *(0.102)*	-0.005 *(0.101)*
Sex of the household head	-0.415** *(0.205)*	-0.433** *(0.207)*	-0.406** *(0.204)*
Total land owned	-0.011 *(0.031)*	-0.021 *(0.034)*	-0.017 *(0.033)*
Distance to nearest market	-0.001 *(0.001)*	-0.001 *(0.001)*	0.015** *(0.007)*
Social capital	0.013* *(0.007)*	0.014* *(0.007)*	-0.001 *(0.001)*
Observations	311	311	311
R^2 (%)	0.2580	0.2635	0.2887

*** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses

[7]The animal receipt variable is a dummy that takes the value of 1 for households that received an animal from HPI

Table 10: SUR regressions for the six budget shares

Variable	Food share	Education and health share	Clothes share	Durable goods share	Household maintenance share	Other goods share
Log total monthly expenditure	-0.078***	0.022***	0.039**	0.013	-0.007	0.009
	(0.011)	(0.007)	(0.019)	(0.011)	(0.005)	(0.022)
Share of income from livestock	0.022**	-0.004	-0.004	0.002	-0.003	0.037
	(0.008)	(0.005)	(0.014)	(0.008)	(0.004)	(0.051)
Number of adults in household	-0.022***	0.018***	0.004	0.001	0.000	-0.067
	(0.004)	(0.003)	(0.007)	(0.004)	(0.002)	(0.069)
Number of children aged 6 to 16	-0.012**	0.009***	-0.008	-0.009	-0.003	-0.0003
	(0.005)	(0.003)	(0.008)	(0.005)	(0.002)	(0.008)
Number of children under age 6	-0.003	-0.012**	0.011	0.018**	0.001	0.023**
	(0.008)	(0.005)	(0.014)	(0.008)	(0.004)	(0.009)
Bargaining power	0.023***	-0.006	0.011	-0.003	-0.001	-0.015
	(0.005)	(0.005)	(0.013)	(0.007)	(0.003)	(0.015)
Education level of the household head	0.000	0.001	-0.002	-0.013**	0.001	-0.019**
	(0.005)	(0.003)	(0.009)	(0.005)	(0.002)	(0.011)
Community of residence dummy (recipient or control)	0.010	0.018*	0.010	-0.038**	0.003	0.013
	(0.016)	(0.009)	(0.027)	(0.015)	(0.007)	(0.01)
Data Round dummy (1= Round 2)	-0.096***	-0.011	-0.019	-0.095***	-0.015	-0.003
	(0.013)	(0.014)	(0.040)	(0.022)	(0.010)	(0.031)
N	546	546	546	546	546	546
R^2 (%)	0.2108	0.1261	0.0188	0.1156	0.0382	

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robust standard errors in parentheses

Different model specifications

Variable	Specification 1 (with share of livestock income	Specification 2 (with livestock income dummy)	Specification 3 (with sex of household head)
Log total monthly expenditure	-0.078*** (0.011)	-0.078*** (0.011)	-0.072*** (0.011)
Livestock income dummy (1=received livestock income	-	-0.014 (0.026)	-
Share of income from livestock	0.022** (0.008)	-	0.023*** (0.008)
Livestock income dummy*data round dummy	-	0.094*** (0.035)	-
Data round dummy (1=Round 2)	0.096*** (0.013)	0.084*** (0.014)	0.095 (0.013)
Number of adults in household	-0.022*** (0.004)	-0.021*** (0.004)	-0.021*** (0.004)
Number of children aged 6 to 16	-0.012** (0.005)	-0.012** (0.005)	-0.009* (0.005)
Number of children under age 6	-0.003 (0.008)	-0.004 (0.008)	-0.005 (0.008)
Bargaining power	0.023*** (0.005)	0.024*** (0.006)	
Sex of the household head	-	-	0.041** (0.016)
Education level of the household head	0.000 (0.005)	0.0003 (0.005)	0.005 (0.006)
Community of residence dummy (recipient or control)	0.010 (0.016)	0.006 (0.016)	0.012 (0.016)
N	546	546	546
R^2 (%)	0.2108	0.2191	0.1949

*** $p<0.01$, ** $p<0.05$, * $p<0.1$, Robust standard errors in parentheses

Table 12: Different model specification; Education budget shares

Variable	Specification 1 (with share of livestock income	Specification 2 (with livestock income dummy)	Specification 3 (with sex of household head)
Log total monthly expenditure	0.022*** (0.007)	0.023*** (0.007)	0.020*** (0.007)
Livestock income dummy (1=received livestock income	-	-0.001 (0.016)	-
Share of income from livestock	-0.004 (0.005)	-	-0.005 (0.005)
Livestock income dummy*data round dummy	-	-0.019 (0.021)	-
Data round dummy (1=Round 2)	-0.011 (0.014)	-0.013 (0.009)	-0.016** (0.008)
Number of adults in household	0.018*** (0.003)	0.018*** (0.002)	0.018*** (0.003)
Number of children aged 6 to 16	0.009*** (0.003)	0.009*** (0.003)	0.008*** (0.003)
Number of children under age 6	-0.012** (0.005)	-0.012** (0.005)	-0.011** (0.005)
Bargaining power	-0.006 (0.005)	-0.007** (0.003)	-
Sex of household head	-	-	0.007 (0.010)
Education level of the household head	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)
Community of residence dummy (recipient or control)	0.018* (0.009)	0.021** (0.009)	0.017* (0.009)
N	546	546	546
R^2 (%)	0.1261	0.1382	0.1261

*** p<0.01, ** p<0.05, * p<0.1   Robust standard errors in parentheses

Variable	Dairy income dummy	Income-receiving animal	Receipt of dairy animals	Receipt of draft cattle	Receipt of goats
Log total monthly expenditure	-0.079***	-0.076***	-0.077***	-0.076***	-0.076***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Dairy income dummy (1=received dairy income)	-0.002 (0.031)	-	-	-	-
Received income-generating animal dummy	-	0.006 (0.020)	-	-	-
Receipt of dairy animal	-	-	0.022 (0.021)	-	-
Receipt of draft animal	-	-	-	0.064** (0.027)	-
Receipt of goats	-	-	-	-	-0.011 (0.020)
Animal received*Round 2 dummy		0.011 (0.026)	0.069** (0.03)	-0.096*** (0.037)	-0.013 (0.027)
Dairy income dummy*Round 2 dummy	0.111*** (0.043	-	-	-	-
Number of adults in household	-0.022*** (0.004)	-0.022*** (0.004)	-0.022*** (0.004)	-0.022*** (0.004)	-0.022*** (0.004)
Number of children aged 6 to 16	-0.011** (0.005)	-0.01** (0.005)	-0.010** (0.005)	-0.010** (0.005)	-0.010** (0.005)
Number of children under age 6	-0.004 (0.008)	-0.005 (0.008)	-0.004 (0.008)	-0.005 (0.008)	-0.004 (0.008)
Bargaining power	0.022*** (0.006)	0.024*** (0.006)	0.024*** (0.006)	0.024*** (0.006)	0.024*** (0.006)
Education level of the household head	0.001 (0.005)	0.0002 (0.005)	0.001 (0.005)	0.000 (0.005)	0.000 (0.005)
Community of residence dummy (recipient or control)	0.008 (0.016)	0.007 (0.016)	0.007 (0.016)	0.016 (0.016)	0.022 (0.016)
Data Round dummy (1= Round 2)	0.090*** (0.014)	0.096*** (0.013)	0.101*** (0.013	0.115*** (0.013)	0.106*** (0.016)
N	546	546	546	546	546
R^2 (%)	0.2207	0.2026	0.2110	0.2133	0.2047

*** $p<0.01$, ** $p<0.05$, * $p<0.1$ Robust standard errors in parentheses

Table 14: SUR regressions showing gender effects on food shares

Variable	Specification 1 (With sex of household head)	Specification 2[8] (With sex of the household head and livestock income dummy interaction)	Specification 3 (With share of livestock income and sex of household &livestock income dummy interaction)
Log of total expenditures	-0.074***	-0.073***	-0.072***
	(0.011)	*(0.011)*	*(0.011)*
Share of livestock income	-	-	0.017*
			(0.009)
Livestock income dummy (1 if household received income from livestock)	0.044**	0.034	-
	(0.018)	*(0.021)*	
Number of adults in household	-0.021***	-0.021***	-0.021***
	(0.004)	*(0.004)*	*(0.004)*
Number of children aged 6 to 16	-0.009*	-0.009***	-0.009*
	(0.005)	*(0.005)*	*(0.005)*
Number of children under age 6	-0.006	-0.006	-0.006
	(0.008)	*(0.008)*	*(0.008)*
Sex of household head	0.041**	0.034*	0.031*
	(0.016)	*(0.018)*	*(0.017)*
Education level of the household head	0.005	0.005	0.005
	(0.006)	*(0.006)*	*(0.006)*
Community of residence dummy (recipient or control)	0.011	0.012	0.011
	(0.016)	*(0.016)*	*(0.016)*
Sex of household head and livestock income dummy interaction	-	0.057	-
		(0.045)	
Data Round dummy (1=Round 2)	0.099	0.099***	0.091***
	(0.013)	*(0.013)*	*(0.013)*
Sex of household head and livestock income dummy interaction in Round 2	-	-	0.095**
			(0.046)
N	546	546	546
R²	0.1928	0.1940	0.2010

*** p<0.01, ** p<0.05, * p<0.1   Robust standard errors in parentheses

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[8] The test of joint significance for the sex of the household head variable and the variable interacting sex and livestock income dummy shows that the variables are jointly significant at 5%, with a p-value of 0.0262

Appendix A: Baseline Survey Instrument

COPPERBELT RURAL LIVELIHOOD ENHANCEMENT SUPPORT PROJECT (CRLESP)
Livestock's Role in Poverty Alleviation
HOUSEHOLD SURVEY

We are working on a research project with Heifer Project International and the University of Illinois (USA) to better understand the role of livestock in this community. Heifer Project supports households in livestock production and this research is intended to help them in their work to improve incomes, diets, and health in this community and other communities in Zambia.

In this research we would like to learn about your household's farm activities, expenses, assets, diet and other related issues. We would also like to record the height and weight of your children and of adults in the household. If you participate, you will have the opportunity to weigh and measure the height of your children over the age of 2 years. We plan to return to conduct a total of 4 similar interviews over the next 18 months. Each interview will take about 1 hour to complete. The person most responsible for farm and business activities would probably be best able to answer the first half of the questions, and the person responsible for preparing food may be best able to answer the questions that come later. The length of the survey will require your patience, but there should be no other risks or discomfort.

Information from these surveys will be analyzed by researchers at the University of Illinois who will report results to the Heifer Project. Results may also be shared in scientific research settings if they provide new information about how livestock affect people's welfare. Lessons from these surveys will be shared, but your specific answers will be kept confidential.

Participation in this survey is voluntary and you may decline to answer any question in it. Your participation will help the Heifer Project in its efforts to support your community. While this research work may affect the way Heifer Project operates, your participation is not required to ensure activities occur in your community.

YOUR ANSWERS AND DATA WILL BE KEPT STRICTLY CONFIDENTIAL

The responsible principle investigator for this survey is Prof. Alex Winter-Nelson of the University of Illinois (+217 244-1381, alexwn@illinois.edu). If you have any questions about your rights as a participant in this study, please contact the University of Illinois Institutional Review Board at +217 333-2670 (collect call accepted if you identify yourself as a research participant) or via email at irb@illinois.edu. You may also contact James Kasongo, Country Director of Heifer International Zambia, +260-211-226996.

A copy of this sheet can be given to all survey participants.

CRLESP HOUSEHOLD SURVEY: ROUND 1

Section A: Identification particulars

No.	Question	Response	Coding
A1	Does an adult in the household agree to participate in the survey?	1. Yes 2. No	[ ]
A2	Community	1. Chembe 2. Kamisenga 3. Kanyenda 4. Kaunga 5. Mwanaombe	[ ]
A3	GPS Coordinates	[S] [E]	
A4	Date	[/ /] Day/Month/Year	
A5	Interviewees name(s) *(Confirm that respondent is an adult familiar with these topics. You may have two respondents Arrange to revisit to meet appropriate person if necessary)*		
A6	Sex of Interviewee(s)	1. Male 2. Female 3. Two respondents, M and F	[ ]
A7	Interviewer name		

SECTION B: FAMILY HOUSEHOLD STRUCTURE

B1. What is your household size (How many people eat together and have been in the household

in the last 3 months?)   [_____]

For each member of the household, please tell us the following information:

ID	B2 Names of household members Including respondent	B3 How is this person related to head of household?	B4 Sex (M/F)	B5 Age (years)	B6 Marital Status (if > 12 yrs)	B7 Education	B8 Main Occupation
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							

(enumerators: confirm that total household members is consistent in B1 and B2)

Key			
B3. Relationship to Household Head	**B6. Marital status**	**B7. Education**	**B8. Occupation (primary)**
1. Self	1. Single	1. 1. Primary Lower (1-4)	1. Student
2. Spouse	2. Married	2. 2. Primary upper (5-7)	2. Farm Laborer (away)
3. son	3. Widow or widower	3. 3. Secondary Basic (8-9)	3. Farmer (at home)
4. daughter	4. Divorced or Separated	4. 4. Secondary H.S. (10-12)	4. Professional Employment
5. in-law or parent		5. 5. Tertiary College (1-3)	5. 5. Casual Employment or laborer
6. 6.Other relative		6. 6. Tertiary University (>3)	6. Self Employed (own business)
7. Other non-relative		6. 7. None	7. 7. Other (specify)
		7. 8. Other (specify)	8.

SECTION C NON-FOOD EXPENDITURES

"We are interested to know what your household buys other than food. Please let us know if your household purchased any of the following items in the last 3 months and how much was spent."

C Non-Food Expenditures	C1. Yes=1 No=2	C2 Total Amount spent (Kwacha)
Clothes or shoes for MEN	[_____]	
Clothes or shoes for WOMEN	[_____]	
Clothes or shoes for CHILDREN	[_____]	
Kitchen equipment (pots etc)	[_____]	
Bedding (blankets, sheets, towels etc.)	[_____]	
Furniture (sofa, table, bed etc.)	[_____]	
Lamp, and other electrical items	[ ]	
Building materials	[_____]	
Transportation (like bus)	[_____]	
Ceremonial expenses (e.g. funerals, weddings)	[ ]	
Offerings to church or other group	[_____]	
Taxes or levies	[_____]	
Medicines or medical care	[_____]	
School fees	[_____]	
School/educational materials	[_____]	
Cigarettes or tobacco	[_____]	
Alcoholic beverages	[_____]	
Matches, candles, batteries, torches, etc.	[_____]	
Laundry and bath soap	[_____]	
Costs of telephone (charge, airtime, phone)	[_____]	
Fuel (wood, charcoal, kerosene)	[_____]	
Total of other consumable goods bought in the last three months	[_____]	

SECTION D: ASSET OWNERSHIP

"We would like to ask some questions about the resources your household has to help you work."

D1. Who owns the land where your household lives? **(read options, circle all that apply)**
1. Husband
2. Wife
3. Both
4. Unmarried head of household
5. Other Relative
6. Other Non-Relative

How much land…	Amount	Unit of measure (HA, Lima, Acre)	Amount paid (kind or kwacha)
D2. How much land does your household own?			
D2a. How much community crop land does your household use?			
D3. How much land, does your household rent from another individual?			
D4. How much land does your household rent out?			
D5. How much land does your household cultivate (crops, trees, garden, etc.)?			
D6. How much improved pastureland does your household operate?			

D7. Does your household use any of the following farm practices: **(read options and circle all that apply)**

1. Crop rotation
2. Manure use
3. Fertilizer use
4. Tree planting
5. Minimum tillage

D. Household Assets: Tools and Equipment

"I am going to list some farm items your household may own. Please tell us how many of each of these items the household owns and what you estimate the items to be worth. For example, if you have 2 old hoes and 1 new hoe, we would want you to report 3 hoes and to tell us how much you think those hoes are worth"

Asset	**D8** Number	**D9** Estimated current value (Kwacha)
TOOLS and EQUIPMENT		
Hoes		
Sickles		
Shovel		
Slashers		
Pangas		
Mortar (Ibende)		
Sieve		
Wheel barrow		
Sprayer		
Maize Sheller		
Grain mill		
Oil press		
Axe		
Other tools and equipment (Specify)		
Other tools and equipment (Specify)		

D "I am going to list some household items your household may own. Please tell us how many of each of these items your household owns and what you estimate the items to be worth."

HOUSEHOLD ASSETS	D10 Number	D11 Estimated current value (Kwacha)
Stored maize, beans or cash crop (specify crop and unit of measure)		
Bicycle		
Radio		
TV		
Solar Panel or other power source		
Automobile or motor bike		
Bed		
Other (specify)		

D12 How many houses do you own? [_____]

"I am going to ask questions about each house <u>owned</u> in the household, starting with the one you live in most."

		House 1	House 2	House 3	House 4
D13 In what year was this house built?					
D14 How many rooms are in the house?					
D15 What is the roof made from?	1. Iron sheets 2. Asbestos 3. Tiles 4. Grass **5.** Plastics **6.** Other (specify)	[_____]	[_____]	[_____]	[_____]
D16 What are the walls made from?	1. Burnt bricks 2. Blocks 3. Mud 4. Plastered 5. Poles 6. Stone 7. Other (specify)	[_____]	[_____]	[_____]	[_____]
D17 What is the floor made from?	1. Cement 2. Dirt 3. Tiles (not wood) 4. Wood 5. Other (specify)	[_____]	[_____]	[_____]	[_____]
D18 How much do you think it would cost to buy or build this house now?	(In Kwacha)	[_____]	[_____]	[_____]	[_____]

E. LIVESTOCK

"I am now going to ask questions about the different types of animals your household might have here."

E0. Does household keep any farm animals of any kind?   1. Yes   2. No   **(If No, skip to F1)**

E1. Has your household ever received an animal from the Heifer Project? (Yes/No)

If No, go to E4

E2. What kind of animal did your household receive?

1. Goat   2. Dairy Cow   3. Draft animal   4. Other

E3. When did your household receive this animal(s)? **(Enter month and year)**

[_____]

E Animals Kept Go through this table row by row	E4 How many animals from the following categories does your household now keep? If zero go to next row	E5 How were the animals acquired? 1. **Purchased with cash** 2. **Purchased with credit** 3. **Purchased in barter** 4. **Inherited** 5. **Gift from Heifer Project** 6. **Gift from other source** 7. **Animal born on farm** 8. **Other (specify)**	E6 What do you think the market value is of all your animals of this type (in Kwacha)?
Beef Cattle (mature, Shacimuntu)			
Beef Cattle (mature, Shachisungu)			
Dairy Cattle (mature, Shacimuntu)			
Dairy Cattle (mature, Shachisungu)			
Draft Cattle (mature)			
Donkeys (mature)			
Other mature large animals, like			
Immature large stock (calves)			
Goats			
Sheep			
Pigs			
Chickens			
Ducks			
Guinea Fowl			

Other			

E. Livestock expenditure.

"In the last 3 months (from November to now) has your household had any of the following expenses related to livestock?"

Type of Expenditure	E7. Estimated total cost for 3 months (in cash/in kind)	E8. What was source (shop, friend, another farmer, government,	E9. Where was the source (name community/town, location)
Feed			
Veterinary care/medicine			
Labour (herding, building, hauling etc)			
Livestock insurance			
Building materials			
Transportation			
Equipment and other supplies			
Supplements (salt, vitamins, dical phosphate, bone			
Other (**Specify)**			

E. Livestock-related assets

"Does your household have any of the following items to support your livestock activities?"

Asset	E10 Number	E11 Estimated current value
Ox Yoke and track chain		
Ox Plough		
Ox Cart		
Livestock shed		
Feeding and water troughs		
Chaff cutter		
Fencing		
Buckets, milking chairs		
Salt/Mineral feeder		
Ox Drawn Ripper/Cultivator		
Ropes		
Other (Specify)		

E12. In the last 3 months (from November up to now), has your household had any income from the sale of live animals?

    1.   Yes   2. No

If No, skip to E18

E. *"In the last 3 months, please tell us the number of each of these animals sold and the price received per animal."*

Sale of Live Animals	**E13.** Quantity sold in the last 3 months	**E14.** Price per animal (on average) **(Indicate in Kwacha and barter terms, if payment in kind)**	**E15.** Where did you sell the animal(s)? 1. Farm gate 2. Local market 3. Road side 4. Town Market 5. Other (specify)	**E16.** Where is that? **(if not the farm gate)**	**E17.** To whom did you sell animal(s)? 1. Butchery 2. Neighbor/friend 3. Trader 4. Family Member 5. Other (specify)
Cattle					
Chicken					
Goats					
Pigs					
Guinea fowls					
Sheep					
Other (specify)					
Other (specify)					
Other (specify)					

E18. In the last 3 months (from November to now) has your household <u>sold any animal products</u> or hired out draft animals?

    1.   Yes   2. No

If No, skip to F1

E. "*Please tell us the amount of the following animal products sold and the price received during the last ONE month?*"

Sale of Animal Products	E19. In the last month, did your household sell any **(Product)** 1. Yes 2. No **If No, go to next product**	E20. To whom did you sell the product? 1. Neighbor/friend 2. Family Member 3. Trader 4. Cooperative 5. Market 6. Other (specify)	E21. Where are they located?	E22. Quantity Sold in last month		E23. Income from sales in last month
				Amount	**Unit**	**Kwacha, labour hours or goods.**
Milk						
Meat						
Eggs						
Hire out of draft animal					**Days**	
Manure						
Other (specify)						

E. "*Please tell us the amount of the following animal products sold and the price received during the last THREE months (since November)?*"

Sale of Animal Products	E24. In the last 3 months, did your household sell any **(Product)** 1. Yes 2. No **If No, go to next product**	E25. To whom did you sell the product? 1. Neighbor/friend 2. Family Member 3. Trader 4. Cooperative 5. Other (specify)	E.26 Where are they located?	E27. Quantity Sold in last 3 months		E28. Income from sales in last 3 months
				Amount	**Unit**	**Kwacha, labour hours or goods.**
Milk						
Meat						
Eggs						
Hire out of draft animal					**Days**	
Manure						
Other (specify)						

F Farm Income, not from animals

"Please indicate the quantities of crops your household produced and sold last year, and their value."

Type of Crops	F1. Area cropped for last season (2011 harvest)		F2. Amount harvested last season (2011)		F3. Amount sold from last harvest		F4. Sales price per unit sold
	Amount	Unit (HA/Lima/Acre)	Amount	Unit (bag/kg/other)	Amount	Unit	Price and Unit (or barter terms)
1. Maize							
2. Groundnuts							
3. Cassava							
4. Beans							
5. Sweet Potatoes							
6. Irish potatoes							
7. Soya Beans							
8. Other (specify)							
9. Other (specify)							
10. Other (specify)							

F5. Did your household sell any fruits or vegetables (such as mangoes or tomatoes) from your farm last year?

1. Yes
2. No

If No, skip to F7.

F6. What was the value of all the fruits and vegetables your household sold last season?

Income from off-farm income and non-farm activities

"Please provide information about your off-farm and non-farm income sources"

F7. Did anybody in this household earn income from off-farm or non-farm sources in the last year? **(GIVE EXAMPLES FROM F8)**

Yes   2. No

If No, skip to F12.

F. *"For each of these activities, please indicate your household's earnings in the last month and last 3 months."*

No.	Types of Income	F8. Amount received last month in-kind	F9. Amount received last month in cash	F10. Amount received in last 3 months in-kind	F11. Amount received in last 3 months in cash
		Form and Amount (example: 2 bags maize)	Kwacha	Form and Amount (example: 6 bags maize)	Kwacha
1	Income from wage labour on another farm				
2	Income from non-farm wage labour				
3	Income from trading/marketing in (second hand clothes, soap, foods)				
4	Income from piecework/crafts				
5	Income from salaried work				
6	Profit from own business **(like brewing, charcoal burning, money lending, fishing other businesses)**				
7	Other (specify)				

Income from gifts and remittances

F 12. In the last 12 months, did anybody in this household receive gifts, remittances or transfers from a person or group that is not currently residing at your home?

  1. Yes   2.No

If No, skip to FF1 in Round 1.

F13 Type of transfer 1.Remittance 2. Gift 3. Inheritance 4. Payment of debt 5. Pension 6. Other(specify)	F14 How is the source of transfer related to you? 1. Child 2. Parent 3. Spouse 4. Other relative 5. Unrelated individual 6. Charitable group 7. Government or former employer	F15 How many times did your household receive transfers from this source in the last 12 months?	F16 What is the usual amount of the transfers from this source?	F17 What was the total amount transferred over the last 12 months?

F13 Type of transfer 1.Remittance 2. Gift 3. Inheritance 4. Payment of debt 5. Pension 6. Other(specify)	F14 How is the source of transfer related to you? 1. Child 2. Parent 3. Spouse 4. Other relative 5. Unrelated individual 6. Charitable group 7. Government or former employer	F15 How many times did your household receive transfers from this source in the last 12 months?	F16 What is the usual amount of the transfers from this source?	F17 What was the total amount transferred over the last 12 months?

F18. Has your household sold any assets like land, houses, or equipment in the last six months?

1. Yes

2. No

FF. Savings, Credit and other Services.

FF1. Does anybody in the household have a Bank Account?

1. Yes   2. No

FF2. In the last year, has anybody in the household received a loan or credit in cash or in kind?

1.Yes   2. No

If Yes, go to FF4.

FF3. Why didn't the household take out a loan? **(read options and circle all that apply**)

1. No need

2. Tried but was denied

3. No place to borrow from

4. Interest rates and costs too high

5. Other

FF. *"Please give the details about the loan or loans your household was able to secure."*

FF4. Source of loan or credit 1. Bank 2. Microfinance NGO (name) 3. Friend/Relative 4. Credit group/club 5. Moneylender 6. Government 7. Supplier	FF5. Amount of loan or credit **Cash or in-kind**	FF6. Purpose of loan or credit 1. Buy farm equipment or structures 2. Pay for farm inputs or labour 3. Start or expand business 4. Buy livestock 5. Trade credit 6. Buy consumption goods 7. Pay for School costs 8. Wedding/Funeral costs

8. Other		9. Other (specify)

FF7. Has anyone in the household received training in any of the following topics?

	Topic	1= Yes	2= No
1	Group management skills		
2	Enterprise development skills		
3	Animal husbandry & health		
4	Integration of animal husbandry in crop production		
5	Marketing of farm products		
6	Environmental conservation		
7	Water and sanitation		
8	Maternal nutrition		
9	Nutrition and Diet		
10	Food storage		
11	Food processing and utilization		
12	HIV/AIDs		
13	Gender rights and human rights		
14	Leadership		
15	Other (specify)		

SECTION G. Storage and Food Security

Crop	G1. How do you store harvested	G2. For how many months did your last	G3. What share of your	G4. After your stored crop was used up, how did you get more?

	crops that will be consumed at home? 1. Traditional crib 2. Improved crib 3. Sacks 4. Other (specify)	stored harvest last? 1. 0-3 2. 3-6 3. 6-9 4. 9+	last stored harvest was spoiled in storage? **Enter Percentage**	**Do not read options** 1. Not applicable, have not run out 2. Bought at local market 3. Bought at distant market 4. Borrowed 5. Gifts from friends or relatives 6. Help from government or NGO 7. Did not get more 8. Other
Maize				
Beans				
Groundnuts				
Velvet beans				
Cassava				
Other (specify)				

H FOOD EXPENDITURES.

"Thank you for your patience so far. Now we have questions about food, diet, and health. It might be best if the person responsible for cooking and feeding the family answered these questions."

H1. If there is a new respondent, indicate name here

[_____]

"For the following food items, please let us know how much your household has bought, received as a gift, or consumed from household production in the last week (7 days)."

H Food Expenditures	H2. Quantity consumed in the household in last 7 days **(Units)**	H3. From the total amount consumed, what percentage was from			
		H3a Own Production	H3b Gifts	H3c. Purchases	H3d. What was the cost of purchases (Kwacha or Kind)
Maize					
Rice					
Other grains, Groundnuts, beans, dried peas or lentils					
Costs of milling					
Potatoes or other roots or tubers					
Vegetables					

Fruits				
Meat, fish or chicken (in kilos)				
Eggs (#)				
Milk (in litres)				
Cooking Oil				
Bread				
Pasta				
Tea/coffee				
Sugar				
Butter, margarine, other fat				
Soft drinks				
Salt/spices/seasonings				
Other				

SECTION I. FOOD CONSUMPTION (all rounds)

"Now we have some questions about the food eaten in this household. At this point it might be better to speak to the person who does the cooking."

I0. If there is a change in the respondent enter the name of the new respondent here [_____]

Food group	Food item	I1. In the last 24 hours did people in your household eat any… 1=Yes 2=No If No, skip to I4	I2. Did everyone eat this food? 1=Yes 2=No If yes, skip to I4	I3. Who did not eat this food? Enter name found on B2	I4. On how many days in the past week did people in your household eat <FOOD GROUP>, such as <FOOD ITEM> INDICATE NUMBER OF DAYS 0 to 7.
Cereal	Nshima , Bread, Rice, Millet, Sorghum, Samp, etc	[_____]			[_____]
White tuber	Irish potatoes, Sweet Potatoes, Cassava	[_____]			[_____]
Yellow and Orange Vegetable and tubers	Pumpkin, carrots, Squash, or Sweet potatoes that are orange inside, Tomatoes, impwa, Mponda	[_____]			[_____]
Dark-leafy, green vegetables	Sweet pepper , cassava leaves etc	[_____]			[_____]
Orange or red fleshed fruits	Ripe mangoes, pawpaw, other red or orange fruits	[_____]			[_____]
Other fruits	Other fruits, including wild fruits, citrus fruits	[_____]			[_____]
Meat or chicken	Beef, goat, pork, rabbit, wild game, chicken, duck, liver, kidney etc.	[_____]			[_____]
Eggs	Eggs	[_____]			[_____]
Fish	Fresh or dry	[_____]			[_____]
Legume, nuts and seed	Beans, peas, lentils, groundnuts, seeds.	[_____]			[_____]
Milk and milk products	Milk, cheese, yogurt or other milk products	[_____]			[_____]
Oils and fats	Oil, fats or butter added to food or used for cooking.	[_____]			[_____]
Non alcoholic	Sugar, honey, sweetened soda,	[_____]			[_____]

beverages and sweets	sweets or candies.				

SECTION J Perceived food security and poverty

J1. When you think about what you can feed your household, which of these best describes your situation?
(read and enter one response)

1. Always able to feed my family enough of the foods I want to give them.
2. Always able to feed my family enough food, but not always the variety of foods I want to give them.
3. Usually able to feed my family enough food, but not the variety I want to give them.
4. Usually unable to feed my family enough food or the variety I want to give them.

[_____]

J 2. In general, in which of these ways would you describe your household? **(read and enter one response)**	**J 3**. Thinking about your community, in which of these ways would you describe your household? **(read and enter one response)**	**J 4.** Thinking about your household circumstances a year ago, would you say things are: **(read and enter one response)**
1. We always have more than enough 2. We always have at least enough 3. We usually have enough, but sometimes need help	1. Very rich 2. Rich 3. Comfortable 4. Able to get by 5. Never having quite enough 6. Poor 7. Very poor	1. Getting better 2. About the same 3. Getting worse
[_____]	[_____]	[_____]

SECTION K. SANITATION AND ENVIRONMENT

K1. What is the main water source of the household? **(Multiple answers possible. DO NOT READ OPTIONS)** 1. River 2. Borehole 3. Unprotected well 4. Protected well 5. Spring 6. Piped Water 7. Other (specify	**K2.** Does this source give enough water all the time? 1=Yes 2 = No	**K3.** Do you treat your water before drinking it? 1= Yes 2=No **(IF NO, SKIP TO K5)**	**K4.** How do you treat drinking water? **(DO NOT READ OPTIONS)** 1. Boiling 2. Chlorination 3. Solar disinfection 4. Other
[_____]	[_____]	[_____]	[_____]

K5. Do you have a latrine at your household? 1. Yes 2. No **IF NO, SKIP TO K7**	K6. What type of latrine is it? 1. Ordinary pit latrine 2. Latrine with sanplat 3. Improved traditional latrine	K7. How many times have you or any member of your household had diarrhea in the last three months? **Enter number of times**
[_____]	[_____]	[_____]

K8. What do you think is the main cause of diarrhea? **(DO NOT READ OPTIONS)** 1. Mosquito bites 2. Unsanitary water/food , feces/flies 3. Witchcraft 4. God/fate 5. Teething 6. Other 7. Do not know	K9. Can you describe any ways to prevent diarrhea? **(DO NOT READ OPTIONS)** 1. Boil drinking water 2. Chlorinate drinking water 3. Wash hands before handling food 4. Wash hands after using latrine 5. Cover food 6. Wash vegetables 7. Store water in proper containers	K10. Can you name any ways to treat diarrhea? **(DO NOT READ OPTIONS)** 1. Use Oral Rehydration Solution (ORS) 2. Take treatment 3. Drink salt, sugar, water solution 4. Drink more 5. Eat less 6. Other
[_____]	[_____]	[_____]

K11. How consistently do you consider yourself to be in good health? (**read options and circle one that applies**)
1. Always
2. Most of the time
3. Sometimes
4. Rarely

K12. How many people in this household would you say are in good health right now?_____

K13. How many people in this household would you say are now or are frequently sick?_____

SECTION M. BODY MEASUREMENT (Children 24 – 59 Months) (ROUND 1 and 4 only) *"We would like to record the heights and weights of people in this household who are over 2 years old. We have a scale and measuring tape that can be used to take these measurements. Please use these tools to answer these questions. We would be happy to help you use them if you wish."*

M1. ID code (from B2)	M2. Fill sex from household roster 1 male 2 female	M3. Date of birth dd /mm/yyyy	M4. Measure and record weight **Kilograms**	M5. Measure child standing if child is 24 months old or older **Centimeters**
		[___/____/_____ _]	[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]	[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]	[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]	[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]	[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]	[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]	[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]

Adult body measurement

M7 ID Code (from B2)	M8 Age	M9 Sex (1- male (2-female)	M10 Weight in Kg	M12.Height in cm
	[____]	[____]	[____][____].[____]	[____][____][____].[____]
	[____]	[____]	[____][____].[____]	[____][____][____].[____]
	[____]	[____]	[____][____].[____]	[____][____][____].[____]
	[____]	[____]	[____][____].[____]	[____][____][____].[____]

THANK YOU VERY MUCH FOR COMPLETING THIS SURVEY. WE APPRECIATE YOUR TIME AND THOUGHT.

Appendix B: Round 2 Survey Instrument

COPPERBELT RURAL LIVELIHOOD ENHANCEMENT SUPPORT PROJECT (CRLESP)
Livestock's Role in Poverty Alleviation
HOUSEHOLD SURVEY ROUND 2

We are working on a research project with Heifer Project International and the University of Illinois (USA) to better understand the role of livestock in this community. Heifer Project supports households in livestock production and this research is intended to help them in their work to improve incomes, diets, and health in this community and other communities in Zambia.

In this research we would like to learn about your household's farm activities, expenses, recent experiences, diet and other related issues. We interviewed you with a similar questionnaire in January or February of this year. This is the second of a total of 4 similar interviews over the next 18 months. Each interview will take about 1 hour to complete. The person most responsible for farm and business activities would probably be best able to answer the first half of the questions, and the person responsible for preparing food may be best able to answer the questions that come later. The length of the survey will require your patience, but there should be no other risks or discomfort.

Information from these surveys will be analyzed by researchers at the University of Illinois who will report results to the Heifer Project. Results may also be shared in scientific research settings if they provide new information about how livestock affect people's welfare. Lessons from these surveys will be shared, but your specific answers will be kept confidential.

Participation in this survey is voluntary and you may decline to answer any question in it. Your participation will help the Heifer Project in its efforts to support your community. While this research work may affect the way Heifer Project operates, your participation is not required to ensure activities occur in your community.

YOUR ANSWERS AND DATA WILL BE KEPT STRICTLY CONFIDENTIAL

The responsible principle investigator for this survey is Prof. Alex Winter-Nelson of the University of Illinois (+217 244-1381, alexwn@illinois.edu). If you have any questions about your rights as a participant in this study, please contact the University of Illinois Institutional Review Board at +217 333-2670 (collect call accepted if you identify yourself as a research participant) or via email at irb@illinois.edu. You may also contact James Kasongo, Country Director of Heifer International Zambia, +260-211-226996.

A copy of this sheet can be given to all survey participants.

CRLESP HOUSEHOLD SURVEY: ROUND 2

Section A: Identification particulars

No.	Question	Response	Coding
A1	Does an adult in the household agree to participate in the survey?	1. Yes 2. No	[ ]
A2	Community	1. Chembe 2. Kamisenga 3. Kanyenda 4. Kaunga 5. Mwanaombe	[ ]
A3	GPS Coordinates	[S] [E]	
A4	ARE THESE GPS Coordinates consistent with those recorded for this questionnaire number in round 1	1. Yes 2. No	[ ]
A5	Date	[__ __ /__ __ /__ __ __ __] Day/Month/Year	
A6	Interviewees name(s) *(Confirm that respondent is an adult familiar with these topics. You may have two respondents. Arrange to revisit to meet appropriate person if necessary)*		
A7	Sex of Interviewee(s)	1. Male 2. Female 3. Two respondents, M and F	[ ]
A8	Interviewer name		

ENUMERATORS NOTE:
Compare information here with round 1 survey for the same questionnaire number:
Is the respondent the same person?   YES/NO
 If yes, continue with section B of questionnaire.
 If no, ask whether the original respondent is or was a member of this household? YES/NO
 If yes, attempt to include that person in the interview and continue with section B.
 If no, determine whether any individuals listed in section B are part of this household.
 SOME OR ALL/NONE
 If Some or all, continue with questionnaire.
 If None, find the name of this respondent or the name of this household head on the index.
Record the questionnaire number and GPS information associated with this household head in the first round. ROUND 1 Questionnaire No_____, ROUND 1 GPS _____.
Continue with section B.

SECTION B: FAMILY HOUSEHOLD STRUCTURE

B1. What is your household size (How many people eat together and have been in the household in the **last 3 months**?)   [_____]

For each current member of the household, please tell us the following information:

ID	B2 Names of current household members Including respondent	B3 How is this person related to head of household?	B4 Sex 1 Male 2 Female	B5 Age (years)	B6 Date of Birth if less than 6 yrs old (Day/Month/Year)	B7 Marital Status (if > 12 yrs old)	B8 Name found on round 1 sheet? 1=yes,2 =no
01					_ _/_ _/_ _		
02					_ _/_ _/_ _		
03					_ _/_ _/_ _		
04					_ _/_ _/_ _		
05					_ _/_ _/_ _		
06					_ _/_ _/_ _		
07					_ _/_ _/_ _		
08					_ _/_ _/_ _		
09					_ _/_ _/_ _		
10					_ _/_ _/_ _		
11					_ _/_ _/_ _		
12					_ _/_ _/_ _		
13					_ _/_ _/_ _		
14					_ _/_ _/		

(enumerators: confirm that total household members is consistent in B1 and B2)

Key			
B3. Relationship to Household Head	**B7. Marital status**		
1. Self	1. Single		
2. Spouse	2. Married		
3. son	3. Widow or widower		
4. daughter	4. Divorced or Separated		
5. in-law or parent			
6 6.Other relative		*1.*	
7. Other non-relative		6.	*2.*

B9. Did any of the individuals listed above join the household since the last round of the survey (**January 2012**)?   1. Yes   2. No

If No, confirm with reference to round 1 section B responses and continue to B14.

	B10 Names of household members who joined or re-joined since **January 2012**	**B11** ID number from B2	**B12** Education	**B13** Occupation	
a					
b					
c					
d					

Key				
B12. Education	**B13. Occupation**			
1. Primary Lower (1-4)	1. Student			
2. Primary Upper (5-7)	2. Farm laborer (away)			
3. Secondary Basic (8-9)	3. Farm (at home)			
4. Secondary H.S. (10-12)	4. Professional Employment			
5. Tertiary College (1-3)	5. Casual Employment/laborer			
6. Tertiary University (>3)	6. Self Employed (own business)	3.		
7. None	7. Other	7.	4.	
8. Other		8.	5.	

B14. Are there any individuals who were part of the household during the last round of this survey in **January 2012** but are no longer in the household?   1. Yes   2. No

If No, confirm with reference to round 1 section B responses and continue.

	B15 Names of household members who were present in January 2012, but are no longer	**B16** Sex 1. Male 2. Female	**B17** Age (years) when last in household	**B18** Reason for leaving 1. Death 2. Marriage 3. Employment opportunity 4. Educational opportunity 5. Stay with relatives 6. Other (specify)	**B19** Current location, if living (town or community)
a					
b					
c					
d					

SECTION C NON-FOOD EXPENDITURES

"We are interested to know what your household buys other than food. Please let us know if your household purchased any of the following items in __the last 3 months__ and how much was spent."

	C Non-Food Expenditures	C1. Yes=1 No=2	C2 Total Amount spent (Kwacha)
a	Clothes or shoes for MEN	[_____]	
b	Clothes or shoes for WOMEN	[_____]	
c	Clothes or shoes for CHILDREN	[_____]	
d	Kitchen equipment (pots etc)	[_____]	
e	Bedding (blankets, sheets, towels etc.)	[_____]	
f	Furniture (sofa, table, bed etc.)	[_____]	
g	Lamp, and other electrical items	[_____]	
h	Building materials	[_____]	
i	Transportation (like bus)	[_____]	
j	Ceremonial expenses (e.g. funerals, weddings)	[_____]	
k	Offerings to church or other group	[_____]	
l	Taxes or levies	[_____]	
m	Medicines or medical care	[_____]	
n	School fees	[_____]	
o	School/educational materials	[_____]	
p	Cigarettes or tobacco	[_____]	
q	Alcoholic beverages	[_____]	
r	Matches, candles, batteries, torches, etc.	[_____]	
s	Laundry, bath soap, lotions	[_____]	
t	Costs of telephone (charge, airtime, phone)	[_____]	
u	Fuel (wood, charcoal, kerosene)	[_____]	
v	Total of other consumable goods bought in the last three months	[_____]	

SECTION D: SOCIAL CAPITAL

Questionnaire No.

D1. What is the main language spoken in your home?
    1. Bemba   2. English   3. Other: specify_____

D2. Was the household head born in this community?
    1. Yes   2. No

D3. How long would it take to travel from here to the place where the parents of the household head live or lived?
    1. Less than an hour
    2. More than an hour but less than half a day
    3. All day
    4. More than a day

D4. Does the household head or his/her spouse belong to a community group or other group?
    1. Yes   2. No
        (if no, skip to D7.)

D5. How many groups, including places of worship, community groups, self-help groups or others does the household head or his/her spouse belong to?_____

D6. Does any member of the household have a leadership role in any of these groups?   1. Yes   2. No

D7. How many people in this community could you turn to for help or advice if you had a problem? _____

D8. How many people in this community might turn to you for help or advice if they have a problem? _____

D9. About how many minutes does it take you to get to the nearest market to buy or sell maize? _____

D10. About how many minutes does it take you to get to a market to buy things for your farm, like fertilizer?_____

D11. About how many minutes does it take you to get to the nearest paved road? _____

D12. How long would it take you to get to a place where you can charge your cell phone? _____

D13. How many days ago was the last time someone in this household used a cell phone? _____

D14. How long does it take you to get to the nearest school? _____

D15. Some people believe it is more important for boys to go to school than girls. Do you agree or disagree with this belief?
    1. Agree   2. Disagree

D16. Who should decide whether a child goes to school?
        1. Mother   2. Father   3. Both parents together   4. other

E. LIVESTOCK

"I am now going to ask questions about the different types of animals your household might have here."

E0. Does household keep any farm animals of any kind?   1. Yes   2. No   **(If No, skip to F1)**

E1. Has your household ever received an animal from the Heifer Project? (1. Yes 2. No)_____

If No, go to E4

E2. What kind of animal did your household receive?

1. Goat   2. Dairy Cow 3. Draft animal   4. Other

E3. When did your household receive this animal(s)? **(Enter month and year)**   [_____/_____]

E. Herd dynamics 1 **Go through this table row by row**	**E4** How many animals from the following categories does your household now keep? **If zero go to next row**	**E5** How many of these animals were acquired in the last 6 months (since **January 2012**, or our last survey round)? **If zero skip to E8**	**E6-E7** How were these **new (E5)** animals acquired**?** 1. **Purchased with cash** 2. **Purchased with credit** 3. **Purchased in barter** 4. **Inherited** 5. **Gift from Heifer Project** 6. **Gift from other source** 7. **Animal born on farm** 8. **Other (specify)**		**E8** What do you think the market value is of **all** your animals of this type (in Kwacha)?
			E6. Most frequent method of acquiring	**E7** Other method of acquiring	
a. Beef Cattle (mature, Shacimuntu)					
b. Beef Cattle (mature, Shachisungu)					
c. Dairy Cattle (mature, Shacimuntu)					
d. Dairy Cattle (mature, Shachisungu)					
e. Draft Cattle (mature)					
f. Donkeys (mature)					
g. Other mature large animals, like mule/horses					
h. Immature large stock (calves)					
i. Goats					
j. Sheep					
k. Pigs					
l. Chickens					
m. Ducks					
n. Guinea Fowl					
o. Other					

E9. Were any animals of yours slaughtered, sold, or lost to disease, injury, theft or other event in the last 6 months (<u>**since the last survey round in January**</u>)?

1. Yes   2. No

If No, skip to E 14

E. Herd dynamics 2 **Go through this table row by row**	**E10.** How many were slaughtered for home use in the last 6 months (<u>**since January**</u>)?	**E11.** How many were sold live in the last 6 months (<u>**since January**</u>)?	**E12.** How many were lost to disease, injury, theft, or some other event in the last 6 months (<u>**since January**</u>)?	**E13.** Total number of animals reduced from group.
a. Beef Cattle (mature, Shacimuntu)				
b. Beef Cattle (mature, Shachisungu)				
c. Dairy Cattle (mature, Shacimuntu)				
d. Dairy Cattle (mature, Shachisungu)				
e. Draft Cattle (mature)				
f. Donkeys (mature)				
g. Other mature large animals, like mule/horses				
h. Immature large stock (calves)				
i. Goats				
j. Sheep				
k. Pigs				
l. Chickens				
m. Ducks				
n. Guinea Fowl				
o. Other				

E. Livestock expenditure.

"In the last 3 months (from May to now) has your household had any of the following expenses related to livestock?"

Type of Expenditure	E14. Estimated total cost for **3 months** (in cash/in kind)	E15. What was source (shop, friend, another farmer, government, mutual group...)	E16. Where was the source **(name community/town, location)**
a. Feed			
b. Veterinary care/medicine			
c. Labour (herding, building, hauling etc)			
d. Livestock insurance fund			
e. Building materials			
f. Transportation			
g. Equipment and other supplies			
h. Supplements (salt, vitamins, dical phosphate, bone meal)			
i. Other (**Specify**)			

E17. In the last 3 months (from May up to now), has your household slaughtered any animals for home consumption?

    1. Yes   2. No   **If No skip to E20**

Slaughter of Live Animals for home consumption	E18. Quantity slaughtered in the last **3 months**	E19. Who in the household chooses when to slaughter for home consumption 1. Male 2. Female 3. Joint decision
a. Cattle		
b. Chicken		
c. Goats		
d. Pigs		
e. Guinea fowls		
f. Sheep		
g. Other (specify)		
h. Other (specify)		

i. Other (specify)		

E20. In the **last 3 months** (from May up to now), has your household had any income from the sale of live animals?

1. Yes   2. No

If No, skip to E26

E. *"In the **last 3 months**, please tell us the number of each of these animals sold and the price received per animal."*

Sale of Live Animals	E21. Quantity sold in **the last 3 months**	E22. Price per animal (on average) (Indicate in Kwacha and barter terms, if payment in kind)	E23. Where did you sell the animal(s)? 1. Farm gate 2. Local market 3. Road side 4. Town Market 5. Other (specify)	E24. Who in the household makes these sales decisions?** 1. Male 2. Female 3. Both together	E25. To whom did you sell animal(s)? 1. Butchery 2. Neighbor/friend 3. Trader 4. Family Member 5. Other (specify)
a. Cattle					
b. Chicken					
c. Goats					
d. Pigs					
e. Guinea fowls					
f. Sheep					
g. Other (specify)					
h. Other (specify)					
i. Other (specify)					

**Enumerators Note: For E24 and similar questions you will usually be told the name of the individual. Record only the sex using the codes.

E26. In the last **3 months** (from May to now) has your household **sold any animal products** or hired out draft animals?

1. Yes   2. No

If No, skip to F1

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E. *"Please tell us the amount of the following animal products sold and the price received during the last ONE month?"*

Sale of Animal Products	E27. In the last month, did your household sell any (Product) 1. Yes 2. No **If No, go to next product**	E28. To whom did you sell the product? 1. Neighbor/friend 2. Family Member 3. Trader 4. Cooperative 5. Market 6. Other (specify)	E29. Who in household makes these sales decisions?* 1. Male 2. Female 3. Both	E30. Quantity Sold in last month		E31. Income from sales in last month
				Amount	**Unit**	**Kwacha**
a. Milk						
b. Meat						
c. Eggs						
d. Hire out of draft animal						
e. Manure						
f. Other (specify)						

* Enumerators Note: For E29 and similar questions you will usually be told the name of the individual. Record only the sex, using the codes provided.

E. *"Please tell us the amount of the following animal products sold and the price received during the last THREE months (__since May__)?"*

Sale of Animal Products	E32. Quantity Sold in __last 3 months__			E33. Income from sales in __last 3 months__
	Amount	**Unit**		**Kwacha**
a. Milk				
b. Meat				
c. Eggs				
d. Hire out of draft animal				
e. Manure				
f. Other (specify)				

E34. *"How long would it take to walk to your main source of water, now?"* _____
If less, than five minutes, go and GPS it, else don't do anything. GPS coordinates:
E35. *"What type of water source is it?"*_____ **1 = protected well 2 = unprotected well 3 = bore hole 4 = river, 5 = other _____**
E36. *"How deep is it?"*_____

F Farm Income, not from animals

"Please indicate the quantities of crops your household produced and sold last year, and their value."

Type of Crops	F1. Area cropped for last season (**2011-2012 season**)		F2. Amount harvested last season (**2011-2012 season**)		F3. Amount sold from (**2011-2012 season**)		F4. Sales price per unit sold	F5. Total value of sales	F6. Who in the household makes the sales decision
	Amount	Unit (HA/Lima/Acre)	Amount	Unit (bag/kg/other)	Amount	Unit	Price and Unit (or barter terms)	Kwacha	1. Male 2. Female 3. Jointly
a. Maize									
b. Groundnuts									
c. Cassava									
d. Beans									
e. Sweet Potatoes									
f. Irish potatoes									
g. Soya Beans									
h. Other (specify)									
i. Other (specify)									
j. Other (specify)									

F7. Did your household sell any fruits or vegetables not mentioned already from your farm last year?

1. Yes   2. No   **If No, skip to F9.**

F8. What was the value of all the fruits and vegetables not already reported that your household sold last season?

_____(Kwacha)

Top: "Questionnaire No." with a box.

Then a table with F9, and below a large income table.Questionnaire No. ☐

	a. Amount	b. Unit of measure as reported (HA, Lima, Acre)	c. Area in hectares (enter later)
F9. How much land does your household cultivate (crops, trees, garden, etc.)?			

Income from off-farm income and non-farm activities

F10. Did anybody in this household earn income from off-farm or non-farm sources in the 12 months? year? **(GIVE EXAMPLES FROM F11)**

Yes   2. No   **If No, skip to F15.**

	Types of Income	**F11.** Amount received **last month** in-kind	**F12.** Amount received **last month** in cash	**F13.** Amount received **in last 3 months** in-kind	**F14.** Amount received **in last 3 months** in cash	**F15.** Who earned this income**
		Form and Amount (ex: 2 bags maize)	**Kwacha**	**Form and Amount (ex: 6 bags maize)**	**Kwacha**	**1. Male 2. Female 3. Both**
a.	Income from wage labour on another farm					
b.	Income from non-farm wage labour					
c.	Income from trading/marketing in (second hand clothes, soap, foods)					
d.	Income from piecework/crafts					
e.	Income from salaried work					
f.	Profit from own business **(like brewing, charcoal burning, money lending, fishing other businesses)**					
g.	Other (specify)					

** **Enumerator note: For F15 and similar questions you will usually be given the name of an individual. Record only the sex.**

Income from gifts and remittances

F 16. In the last **12 months**, did anybody in this household receive gifts (not Heifer Project), remittances or transfers from a person or group that is not currently residing at your home?

    1. Yes   2.No _____

If No, skip to F22.

	F17 Type of transfer 1.Remittance 2. Gift 3. Inheritance 4. Payment of debt 5. Pension 6. Other(specify)	F18 How is the source of transfer related to you? 1. Child 2. Parent 3. Spouse 4. Other relative 5. Unrelated individual 6. Charitable group 7. Government or former employer	F19 How many times did your household receive transfers from this source in the last 12 months?	F20 What is the usual amount of the transfers from this source?	F21 What was the total amount transferred over the last 12 months?
a					
b					
c					
d					

F22. Has your household sold any assets like land, houses, or equipment in the last 6 months?

    1. Yes   2. No   **If No, skip to F24**

F23. What was the total value of sales of assets in the last 6 months?

_____(kwacha)

F24. In the last year, has anybody in the household received a loan or credit in cash or in kind?

    1.Yes   2. No   **If NO, skip to G1**

	F25. Source of loan/credit 1. Bank 2. Microfinance NGO 3. Friend/Relative 4. Credit group/club	F26. Amount of loan or credit	F27. Who in household received the loan or credit 1. Male 2. Female **3.** Both	F28. Purpose of loan or credit 1. Buy farm equipment or structures 2. Pay for farm inputs or labour 3. Start or expand

		Kwacha/in kind	together	business
	5. Moneylender 6. Government 7. Supplier 8. Other			4. Buy livestock 5. Trade credit 6. Buy consumption goods 7. Pay for School costs 8. Wedding/Funeral costs 9. Other or multiple (specify)
a.				
b.				

SECTION G. Storage and Food Security

Crop	**G1**. How do you store harvested crops that will be consumed at home? 1. Traditional crib 2. Improved crib 3. Sacks 4. Other (specify)	**G2**. How much did you put into storage? **(note unit of measure)**	**G3.** Who in the household decides how much to store rather than sell? 1. Male 2. Female 3. Both together	**G4.** How much of what you have stored is spoiled or lost in storage? **(note unit of measure)**
a. Maize				
b. Beans				
c. Groundnuts				
d. Velvet beans				
e. Cassava				
f. Other (specify)				

G5. When you think about what you can feed your household, which of these best describes your situation?   **(read and enter one response)**

1. Always able to feed my family enough of the foods I want to give them.
2. Always able to feed my family enough food, but not always the variety of foods I want to give them.
3. Usually able to feed my family enough food, but not the variety I want to give them.
4. Usually unable to feed my family enough food or the variety I want to give them.

[_____]

G6. In general, not just food, in which of these ways would you describe your household?
(read and enter one response)
1. We always have more than enough
2. We always have at least enough
3. We usually have enough, but sometimes need help
4. We always need help to have enough

[_____]

G7. Thinking about your household circumstances a year ago, would you say things are:
(**read and enter one response**)

1. Getting better
2. About the same
3. Getting worse

[_____]

H. FOOD EXPENDITURES.

"Thank you for your patience so far. Now we have questions about food, diet, and health. It might be best if the person responsible for cooking and feeding the family answered these questions."

H1. If there is a new respondent, indicate name here

[_____]

"For the following food items, please let us know how much your household has bought, received as a gift, or consumed from household production in the last week (7 days)."

H Food Expenditures	H2. Quantity consumed in the household in last **7 days** (Units)	H3. From the total amount consumed, how much was from			
		H3a Own Production	**H3b** Gifts	**H3c.** Purchases	**H3d.** What was the total cost of purchases (Kwacha)
a. Maize					
b. Rice					
c. Other grains, Groundnuts, beans, dried peas or lentils					
d. Costs of milling					
e. Potatoes or other roots or tubers					
f. Vegetables					
g. Fruits					
h. Meat (in kilos)					
i. Chicken (#)					
j. Fish (#)					
k. Eggs (#)					
l. Milk (in litres)					
m. Cooking Oil					
n. Bread					
o. Pasta					
p. Tea/coffee					

q. Butter, margarine, other fat					
r. Soft drinks					
s. Sugar, salt, spices, seasonings					
t. Other					

[   ]

SECTION I. FOOD CONSUMPTION (all rounds)

"Now we have some questions about the food eaten in this household. At this point it might be better to speak to the person who does the cooking."

I0. If there is a change in the respondent enter the name of the new respondent here
[_____]

Food group	Food item	I1. In the last **24 hours** did people in your household eat any… **1=Yes 2=No** **If No, skip to I4**	I2. In the last **24 hours** did everyone eat this food, old & young, men & women? **1=Yes 2=No** **If yes, skip to I4**	I3. In the last **24 hours** who did **not** eat this food? **Enter name found on B2**	I4. On how many days in the past week did people in your household eat **<FOOD GROUP>**, such as **<FOOD ITEM>** **INDICATE NUMBER OF DAYS 0 to 7.**
a. Cereal	Nshima , Bread, Rice, Millet, Sorghum, Samp, etc	[____]			[____]
b. White tuber	Irish potatoes, Sweet Potatoes, Cassava	[____]			[____]
c. Yellow and Orange Vegetable and tubers	Pumpkin, carrots, Squash, or Sweet potatoes that are orange inside, Tomatoes, impwa, Mponda	[____]			[____]
d. Dark-leafy, green vegetables	Sweet pepper , cassava leaves etc	[____]			[____]
e. Orange or red fleshed fruits	Ripe mangoes, pawpaw, other red or orange fruits	[____]			[____]
f. Other fruits	Other fruits, including wild fruits, citrus fruits	[____]			[____]
g. Meat or chicken	Beef, goat, pork, rabbit, wild game, chicken, duck, liver, kidney etc.	[____]			[____]
h. Eggs	Eggs	[____]			[____]

i. Fish	Fresh or dry	[____]			[____]
j. Legume, nuts and seed	Beans, peas, lentils, groundnuts, seeds.	[____]			[____]
k. Milk and milk products	Milk, cheese, yogurt or other milk products	[____]			[____]
l. Oils and fats	Oil, fats or butter added to food or used for cooking.	[____]			[____]
m. Non-alcoholic beverages and sweets	Sugar, honey, sweetened soda, sweets or candies.	[____]			[____]

SECTION J. Shocks

J1. In the last **6 months** (since the last round of this survey in January 2012) has anybody in your household suffered any of the following problems?

a. Illness lasting one week or more	1. Yes 2. No
b. Injury taking over a week to recover	1. Yes 2. No
c. Victim of theft or robbery	1. Yes 2. No
d. Victim of other crime	1. Yes 2. No
e. Loss of employment	1. Yes 2. No
f. Major loss or failure in business	1. Yes 2. No
g. Loss of usual source of remittances/gifts	1. Yes 2. No
h. Losses due to fire or flood	1. Yes 2. No
i. Loss of crops due to pests, disease, weed	1. Yes 2. No

J2. In the last **6 months** (since the January 2012 round of this survey) has anyone in this household…

a. Gotten a new job	1. Yes 2. No
b. Had major business expansion or success	1. Yes 2. No

c. Gained a new source of remittance income	1. Yes 2. No
d. Received large gift	1. Yes 2. No

J3. In this community, would you say the rains and weather for farming this year were:

1. Normal   2. Better than Normal   3. Worse than Normal

J4. Can you think of any changes in the last **6 months** that have made things better for people in this community? (eg. Road improvement, reduced crime, better services)

1. Yes   2. No   **J5.** If Yes, what has changed_____

J6. Can you think of any changes in the last **6 months** that have made things worse for the people of this community? (eg. Washed out roads, increased crime)

1. Yes   2. No   **J7.** If yes, what has changed:_____

SECTION M. BODY MEASUREMENT

*"We would like to record the heights and weights of people in this household who are **over 2 years old**. We have a scale and measuring stand that can be used to take these measurements for anybody who is willing."*

M1. ID code (from B2)	M2. Fill sex from household roster 1 male 2 female	M3. Date of birth if less than 6 years old **dd /mm/yyyy**	M4. Age in years if 6 years old or older	M5 Measure and record weight **Kilograms**	M6. Measure and record height **Centimeters**
		[___/____/_____]		[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]		[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]		[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]		[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
		[___/____/_____]		[ ][ ][ ].[ ][ ]	[ ][ ][ ].[ ]
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THANK YOU VERY MUCH FOR COMPLETING THIS SURVEY. WE APPRECIATE YOUR TIME AND THOUGHT.